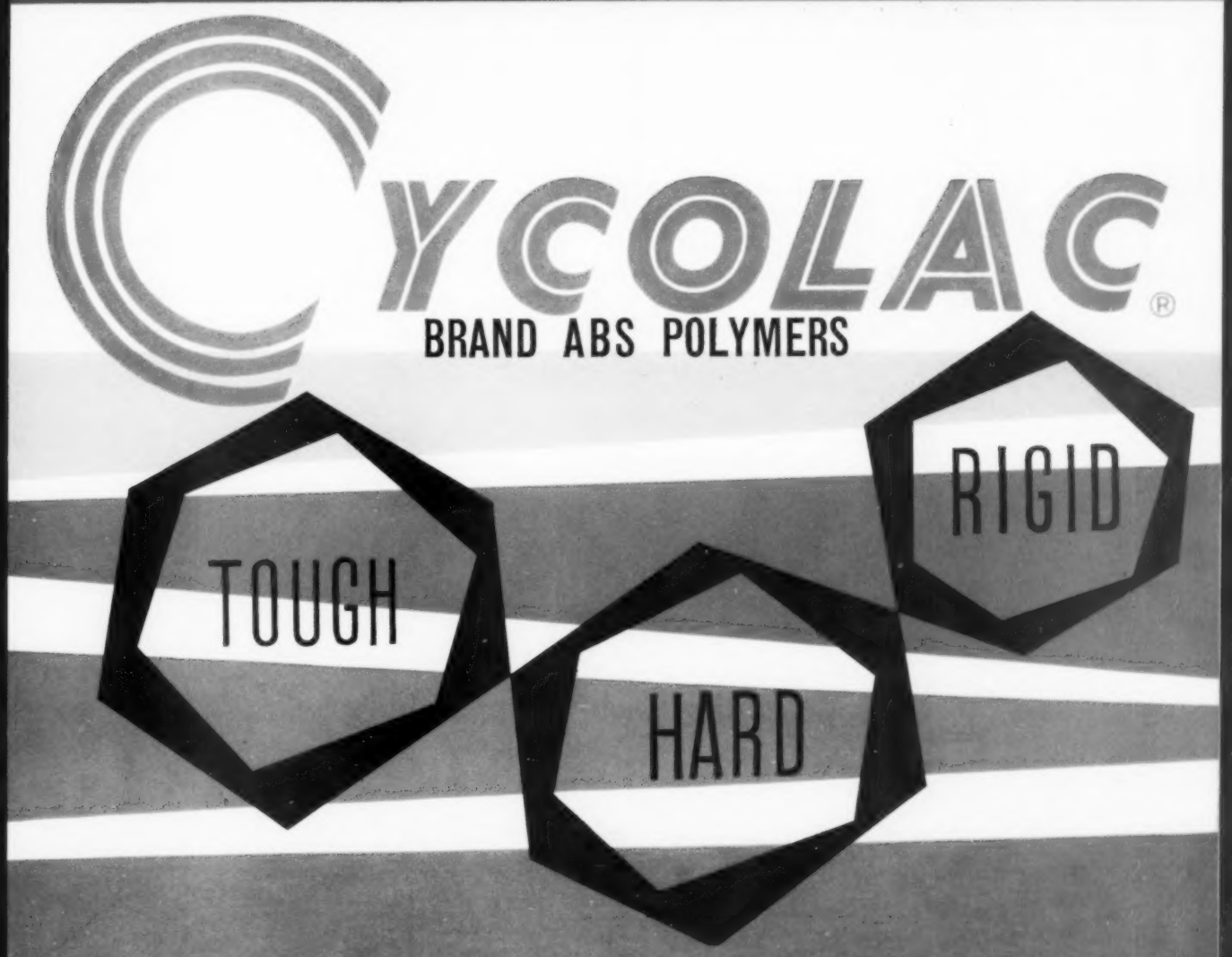
RUBBER and PLASTICS WEEKLY

VOLUME 141 NO. 3 JULY 15 1961 ONE SHILLING



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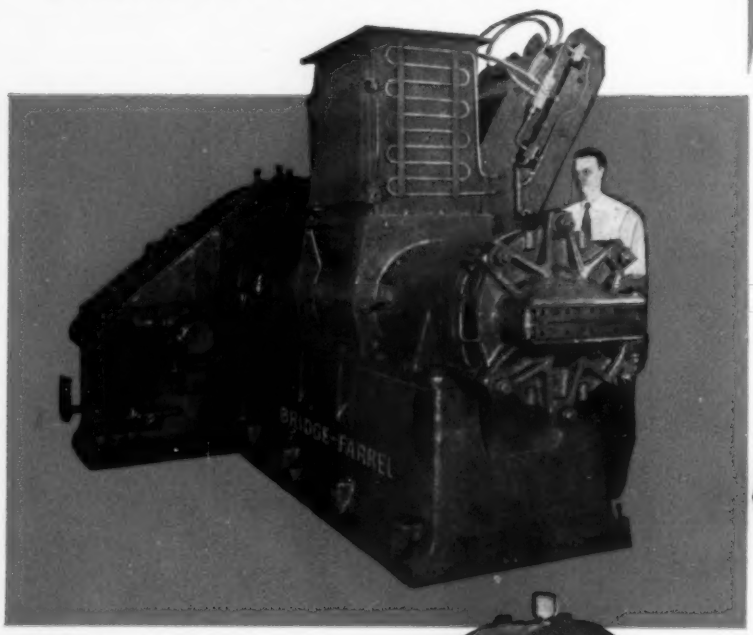

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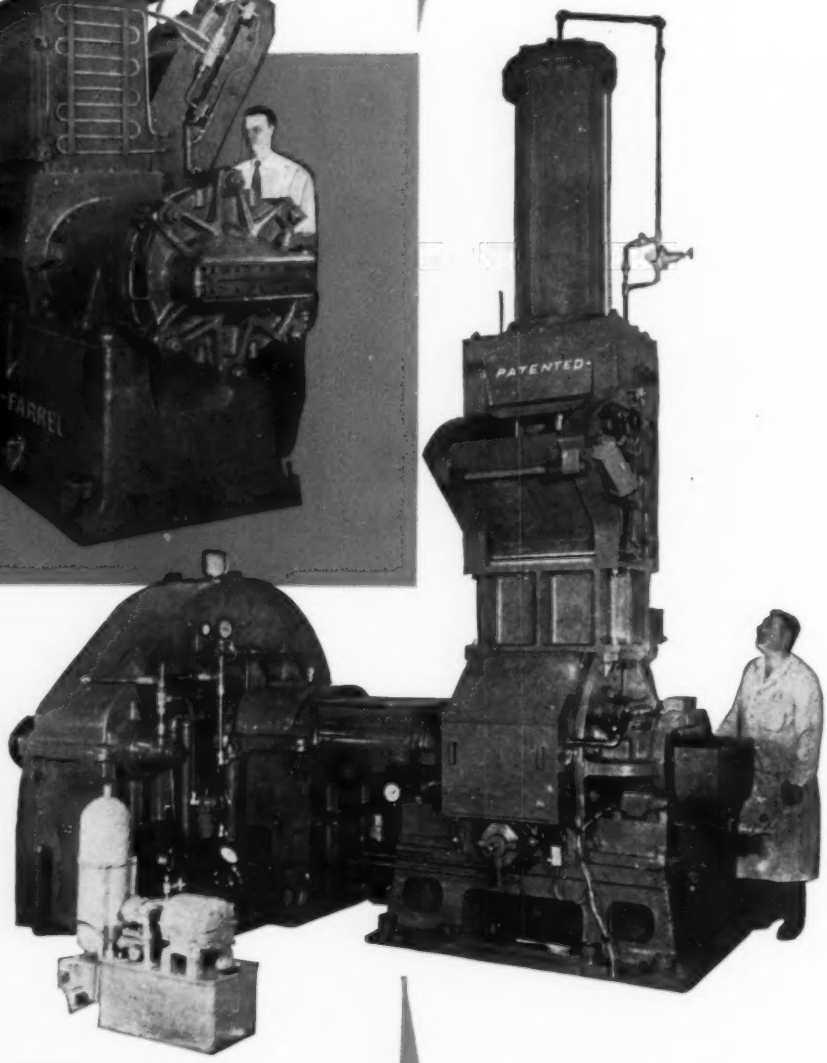

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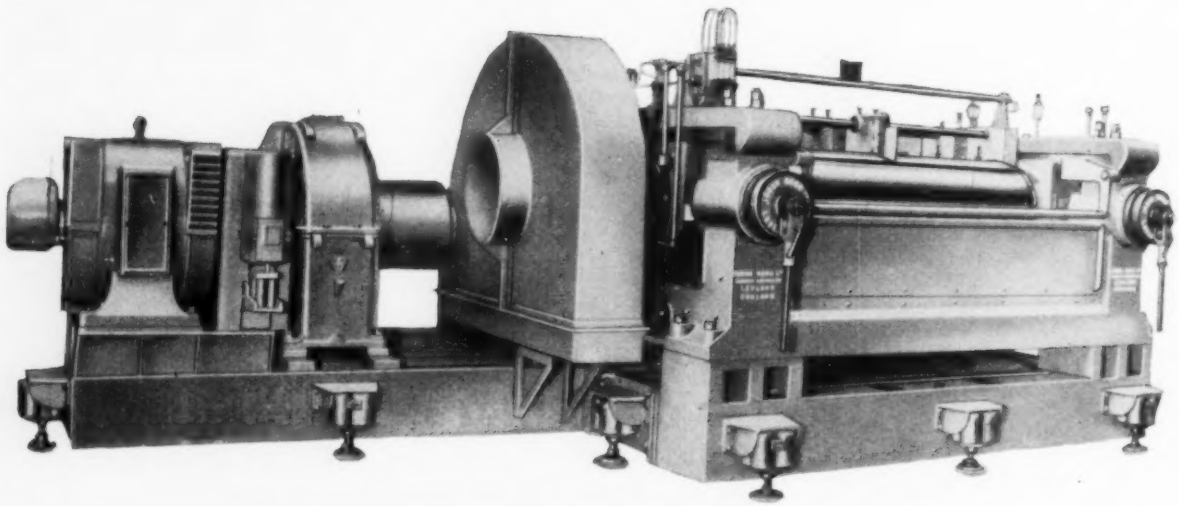

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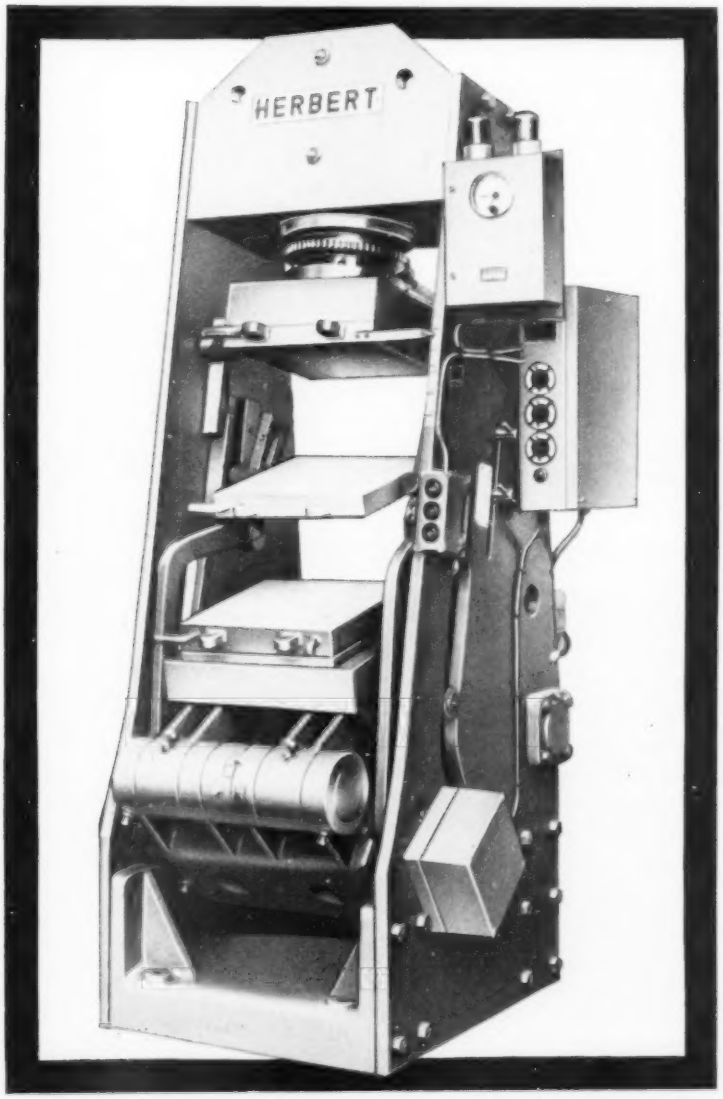

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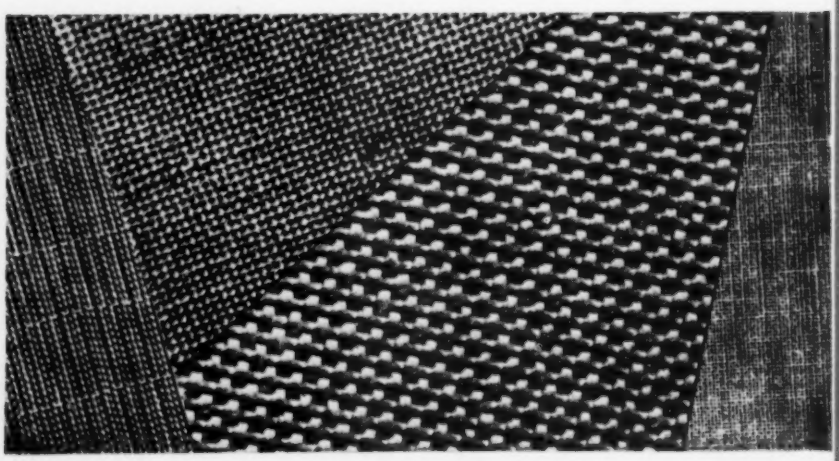

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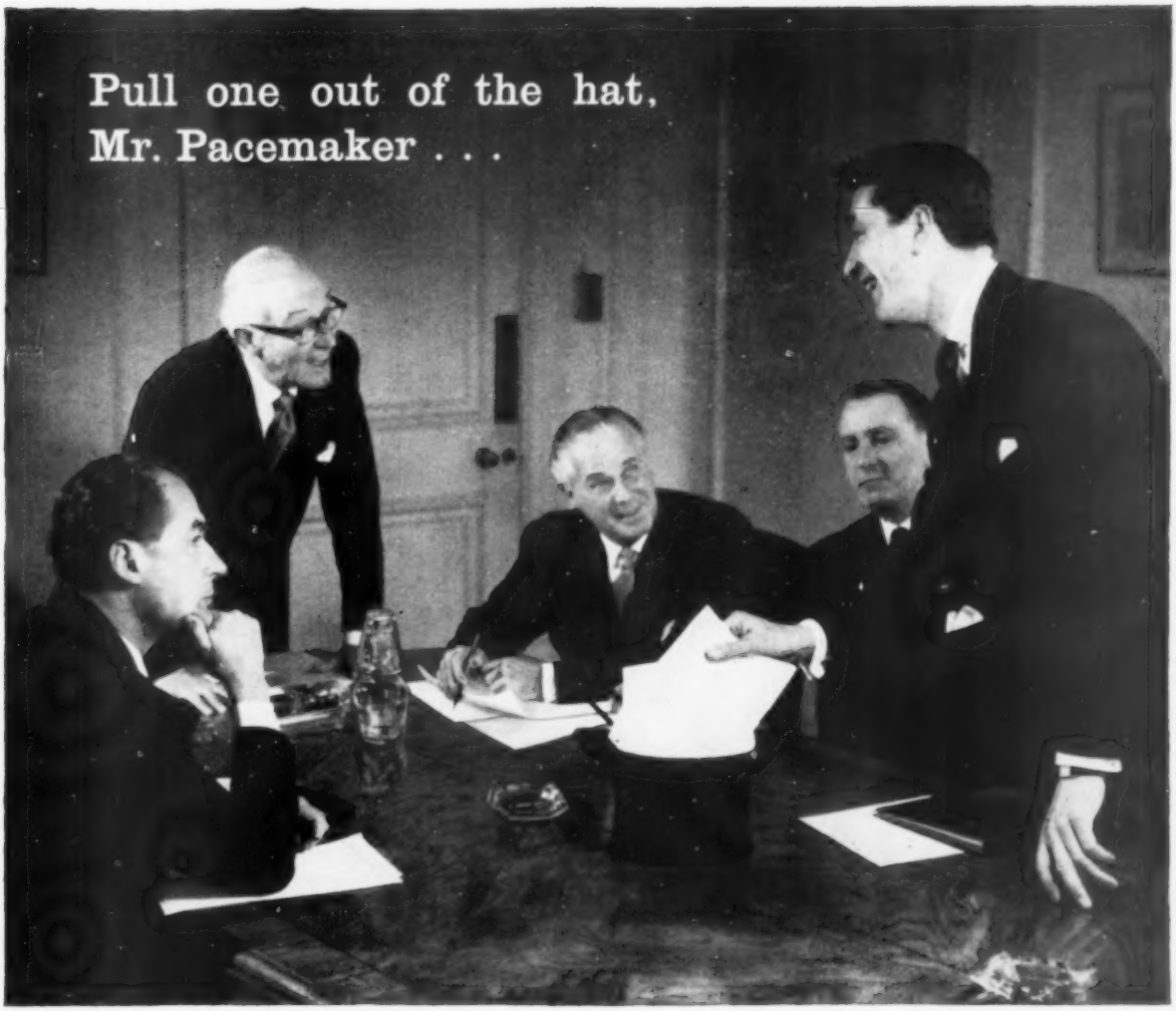

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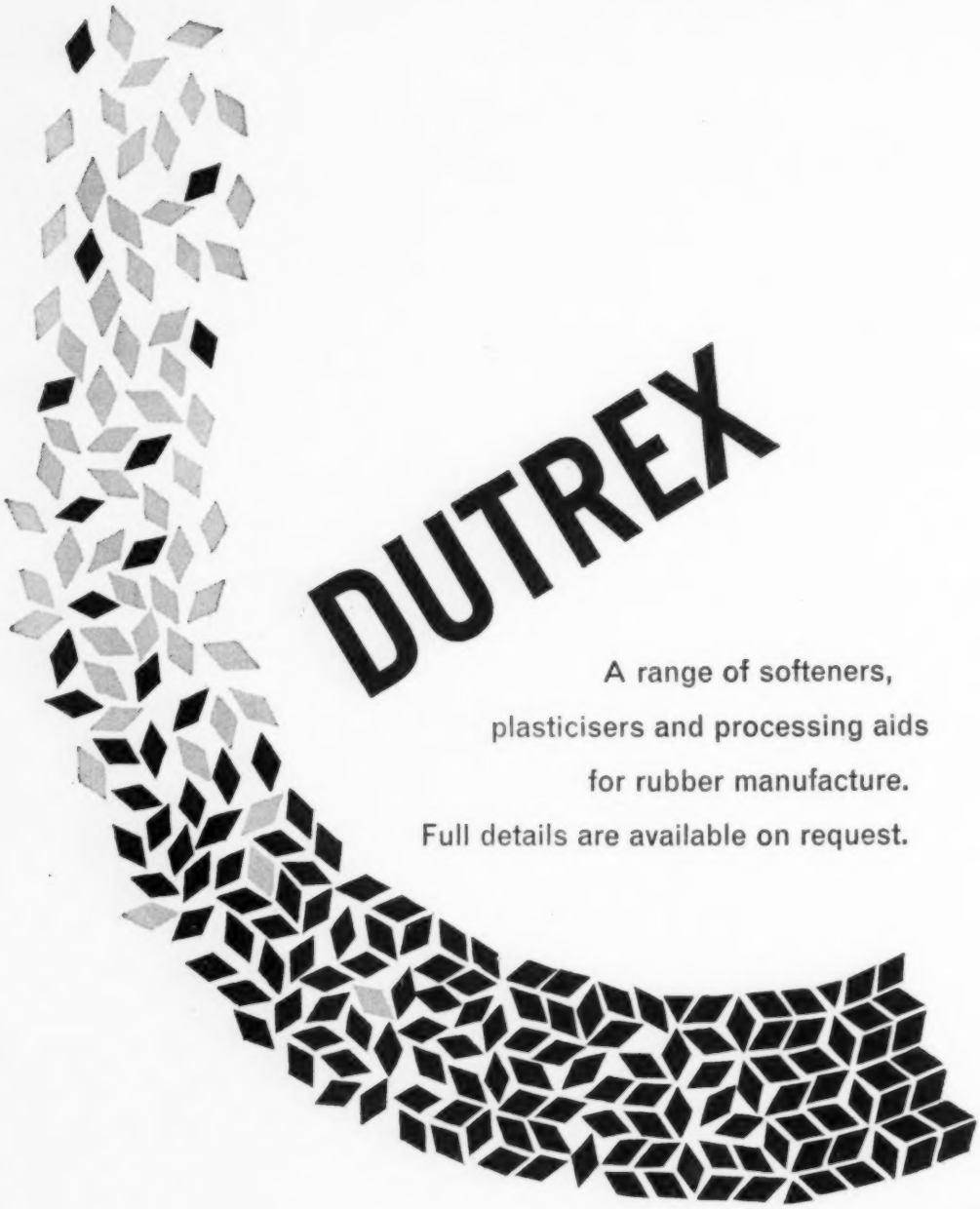

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Volume 141 IN ITS 77th YEAR No. 3

July 15 1961

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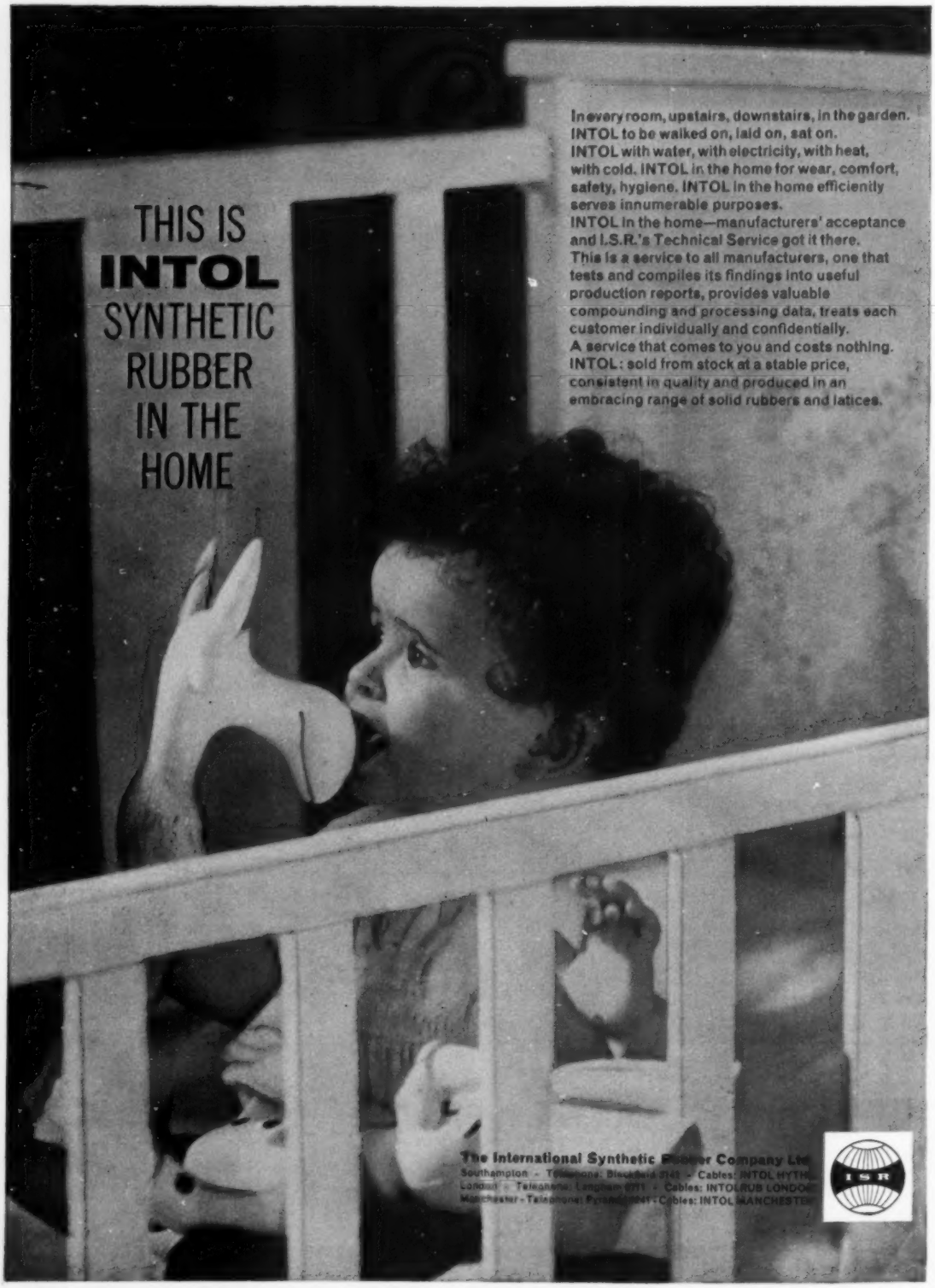
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NOTES of the WEEK

Polyurethane Picture

DU PONT'S decision to build a toluene di-isocyanate plant at Maydown, Northern Ireland (*RPW*, July 8, 40), means that it will be the second UK manufacturer of this raw material for polyurethane foam. I.C.I. Dyestuffs Division, which is the only current producer, expects to put its Fleetwood isocyanate plant on stream in the near future. No capacities have been announced, but trade estimates settle on a figure of 8,000-9,000 tons for each plant.

The polyurethanes have always been something of an enigma. Confident consumption figures have been forecast, but the actual usage has never quite come up to expectation. Now, however, it does look as though the material will fulfill itself and, by the time Du Pont's isocyanate plant goes on stream late in 1963, the demand for polyurethanes should be at least twice what it is now. This will be due to other factors besides expansion in the cushioning trade. Rigid foams, which have found a good outlet in refrigeration and insulation applications, can be expected to do well in the plastics industry's now more co-ordinated effort to enter the building trade. The sound and thermal insulating properties of the foam are leading to increasing usage both above and below ground level. Flexible foams, the main outlet for which is cushioning, have struck a rich seam with the development of foambacks.

In USA, where foambacks are well established after a spectacular entry, 2.5m. lb. of urethane foam are expected to be taken up by the textile industry this year. A growth pattern in proportion can be anticipated in the UK, and an article on this most interesting development, by J. M. Buist and W. F. Smith of the polymer and chemicals service department, I.C.I. Dyestuffs Division, will appear in our July 29 issue.

Development Down Under

THE announcement of Du Pont's isocyanate project comes only a year after the company's first plant at Maydown — the 50m. lb. neoprene unit — went on stream. This is indicative of the confidence that Du Pont has in Northern Ireland as a development area. A recently published report* focuses interest on another development area on the opposite side of the world — Western Australia.

These days expansion overseas is by no means confined to the larger firms, and this report spotlights a number of opportunities for UK industrialists. Whether or not overseas expansion is being considered, reports of this kind are well worth studying for the market information they yield. This report indicates scope for investment in the rubber and plastics fields, and in certain sectors of the economy — such as footwear — it considers that specialist investigation of potential development could be rewarding. Projects that have been finalized include a refinery by B.P. Refinery Ltd. (£8m.); a titanium oxide plant by Laporte Industries Ltd. (£4m.); and a project by British Insulated Callender's Cables Ltd. (£500,000). An interesting point is that, in order to help small firms, the report recommends the establishment of trading estates on the UK pattern.

Rubber tyres, tubes, sheet and strip to the value of £A3m. are imported into Western Australia for domestic use, and considerable quantities are imported in component form: this is sufficient to support a small local industry. It is possible that in time a synthetic rubber plant will be built, deriving its feedstock from the B.P. Refinery.

Western Australia itself is admittedly a very small market. It contains only 7½% of Australia's not very large population. But, in common with Northern Ireland and some other development areas, its importance lies in its proximity to other markets. Apart from the eastern states of Australia, in this case it is on the doorstep of the vast and rapidly growing markets of Asia — an area in which UK exports need to be developed.

*Opportunities for Industrial Investment in Western Australia. Report by a visiting team of British industrialists. Published by the Government of Western Australia.

Status of a Salesman

THE poor UK export record — not only in the East, but generally — has been traced to a variety of causes. Frequently our methods of selling and our salesmen are blamed, but the real fault often lies with the lack of status salesmen have in this country. In some firms the importance and the complexity of selling is recognized; but in others the salesman is relegated to 'the person who has to go out and collect the orders'. The latter type of firm may still believe that goods 'made in Britain' are unique, and that any sales service is so much top dressing. This leads to the complaint in the export field that our salesmen sometimes have not the same power to take on-the-spot decisions as their competitors, and that there are not enough visits paid to foreign markets by top people in UK industry.

In selling abroad we cannot afford to be diffident in our salesmanship. As the President of the Board of Trade has very cogently put it, we sometimes tend to take a rather superior attitude towards the aggressive selling tactics of our competitors — but we cannot take the same attitude towards the results they obtain.

NEWS *Briefs*

POLYBUTADIENE PASSENGER TYRE—MICHELIN PLANS SYNTHETIC PLANT—DIENE PRICE CUT HOUDRY UNIT FOR BRAZIL—MORE CARY PVC

●**Ceylon** — Peter Thorneycroft, the Minister of Aviation, has assured Ceylon that the UK would take no decision on joining the European Common Market 'until after consultations with all Commonwealth Governments'. A communique released after a meeting between Mr Thorneycroft and the Ceylon Prime Minister, Mrs Sirimavo Bandaranaike, said the Ministers had explored fully the implications of such a British move on Ceylon's key exports, including rubber.

●**United States** — Shell Chemical Co. has announced in New York that it has reduced the price of its polyisoprene synthetic rubber by 2 cents a lb. to 26.1 cents for carloads or truckload lots, or to 25 cents per lb. fob at the plant in Torrance, California.

●**France** — The Michelin Co. is to build a synthetic rubber plant in the Bordeaux area. A company announcement did not specify the type of rubber to be produced or the planned production rate. Michelin indicated, however, that the project would involve an investment of 60m. new francs and that operations would begin in 1963. Usually well informed sources thought that the plant might be connected with carbon black production by Cafrablack, a subsidiary of the American Philips Petroleum Co. and Continental Carbon Co. This company's plant started industrial production in January in Ambes, Western France, and produces about 25,000 tons a year.

●**Jamaica** — A company called Jamaica Fibre Glass Products Ltd. has been formed, according to a Barclays Bank DCO report. Products will range from plastic chairs and sheetings to work tools and the company will carry out repair work on aircraft and boats.

●**United States** — Cary Chemicals is planning to expand its pvc production with the construction of a 150m. lb. a year plant. The company's present facilities are based at Flemington and East Brunswick and have a total capacity of 86m. lb.

●**France** — Standard Oil of New Jersey and its French affiliate, Esso-Standard, have acquired a 78% interest in the French synthetic rubber manufacturing firm Socabu (Societe du Caoutchouc Butyl). The remaining 22% belongs to Compagnie Française de Raffinage. The board has decided to go ahead with investigating ways and means of raising capacity from the present 20,000 tons to 25,000 tons in order to consolidate Socabu's exporting position.

●**Italy** — Societa Pirelli of Milan has announced that one of its subsidiaries, Societa Supega of Turin, is to construct at Triggiana, near Bari, a factory for the production of rubber shoes. The plant, which is expected to come into production in the autumn, will have a capacity of 4m. pairs of rubber shoes of all types.

●**Japan** — Three firms are considering expanding their production of medium and low-pressure polythene. The firms are Showa Yuka (present capacity 10,000 tons), Mitsui Petrochemical (12,000 tons) and Furukawa Chemical (9,000 tons). Showa and Furukawa may double their production. 50% of medium and low-pressure polythene is used in Japan in injection moulding, but blow moulders are taking an increasing quantity.

●**Nigeria** — Overseas investment in Western Nigeria is increasing rapidly. The region is pursuing a £164m. development programme. Projects include a £2m. Dunlop tyre plant and a plastics factory which will produce pipes and domestic ware at Ibadan. Partners in the latter project are the United Africa Co. and Yorkshire Copper Ltd. (See page 94.)

●**United States** — A premium passenger tyre that has polybutadiene in the tread and which is claimed to give approximately 60% more mileage than first-line tyres, has been introduced by the United States Rubber Co. The company said it was the first use of polybutadiene in passenger tyres. The rubber has been blended with SBR.

●**Brazil** — Petroleo Brasileiro S.A. (Petrobras) has been licensed by Houdry-Brazilian Co. to construct a 29,000 metric ton per year dehydrogenation unit near Rio de Janeiro. The unit will be situated at Petrobras' synthetic rubber complex now under construction at Duque de Caxias. The dehydrogenation plant will have the flexibility to produce butadiene from normal butane or mixtures of butane and butenes. Feedstocks for the unit will be furnished by Petrobras' new refinery, also located at Duque de Caxias. In addition to the dehydrogenation unit, Petrobras has licensed two large Houdriforming units which are now under construction near Rio de Janeiro and Sao Paulo.

Plastics First at Rotterdam

£7m. ACRYLIC PLANTS AT I.C.I. ROZENBURG

THE first manufacturing project in the Common Market to be undertaken by I.C.I., since the announcement in February of its intention to expand its manufacturing interests in Europe, is to be in the field of plastics.

Plants will be built for the manufacture of Perspex acrylic sheet and Diakon acrylic moulding powder, and for the monomer, methyl methacrylate. The main investment will be on a 300-acre site — to be known as the Rozenburg Works — which I.C.I. is leasing at Rotterdam.

The I.C.I. Board has given approval in principle to the spending of about £7m. on the project, subject to any necessary consents being obtained from the British, Dutch, and other authorities concerned. Construction is expected to begin this year, and it is planned to have some of the plants in production by the end of 1963.

Perspex — like polythene an I.C.I. discovery — is already sold in substantial quantities in Europe, where a range of colours and sheet sizes is marketed. A major outlet is in signs, but it is also used extensively in many glazing, display and advertising applications.

The largest outlet so far for the moulding powder has been in component parts for the car and radio industries, but sales are expected to expand rapidly through applications such as television implosion guards and hand telephone sets.

I.C.I. says that it is preparing to make 'every effort' to enlarge its market in Europe for these materials, prior to the start-up of the Continental plants, by supplying the products on a much-increased scale from manufacturing units in the UK.

Billingham, Wilton and Darwen

Early this year (*RPW* January 21, 84) I.C.I. announced production extensions in the UK for Perspex sheet. The present combined capacity of the Perspex plants at Billingham, Wilton and Darwen is 17,000 tons; this is expected to be lifted to over 20.000 tons by next year.

I.C.I.'s negotiations in Holland have clearly been going very well, since when the first announcement was made (*RPW* March 4, 333) construction was not expected to begin until next year, with the first unit going on stream in 1964.

Divisions that will be concerned with the Rotterdam project besides the Plastics Division are: Dyestuffs, General Chemicals, and Heavy Organic Chemicals. It is also planned to build a number of smaller plants in other parts of the EEC.

Inspecting acrylic sheet before it leaves I.C.I.'s Wilton works. The company hopes to increase acrylic exports to Europe before the Rozenberg plants start production

I.C.I. Dyestuffs MO Killed in Car Crash

DR Michael Williams, medical officer of the Dyestuffs Division of I.C.I., was killed in a car crash at Alfold, Surrey, on Sunday night (July 9).

Dr Williams, who was 44, was a very well-known figure in the rubber industry. At the Rubber Manufacturers Employers' Association health conference last November he delivered a paper on chemical respiratory hazards, with particular reference to isocyanates.

Cancer Expert

Besides his work in the field of industrial medicine, he was an expert on cancer research, being a member of the Commission on Cancer Control and chairman of the Committee on Cancer Prevention of the International Union Against Cancer.

He discovered that some dyestuff intermediates cause cancer of the bladder and, as a result of his work, two of them — 4-aminodiphenyl and 2-napthylamine — ceased to be produced in the UK.

Dr Williams leaves a wife and one daughter.

Firestone Develops 'Rubber-X101'

A NEW tread compound is now being used in Firestone De Luxe and Town and Country tyres — Firestone Rubber X-101.

For some time now tyre manufacturers have been using butyl synthetic rubber in the compounding of car tyre treads. For this purpose butyl has some advantages (in particular a soft ride), but, Firestone comments, it has also a number of disadvantages: it is more expensive, it gives a comparatively poor high-speed performance, and it has a tendency to increase petrol consumption.

Rubber X-101 is the result of attempts to develop the existing synthetic rubbers to obtain as many as possible of the advantages of butyl without any of its disadvantages.

It is a soft tread compound obtained by using existing oil-extended SBR and combining it in a particular way under close control to prevent any reversion to normal type tread stock.

Firestone says that tyres made with this new compound give first-class performances on wet or dry roads, have a high factor of safety, are long wearing and particularly quiet.

MB Goes Irish

Metal Box Co. Ltd. is to establish a plastics packaging company in Dublin, in conjunction with the Irish Glass Bottle Co.

The company, with a starting capital of £300,000, will cover the whole field of plastics packaging.

A site has been chosen in Dublin for a factory which will initially employ about 150 people.

MS Drive for More Exports

Midland Silicone's Ltd., Europe's largest silicone producers, is planning to increase its export drive. 'Although the company's exports have steadily increased over the last few years', says the company, '. . . the export sales department is now augmenting its staff in order to consolidate the firm's position in countries where MS silicones are well known and at the same time to break new ground'.

The new appointments to the department will be specialists in a territory or a group of countries.

The first new appointment is 33-year-old G. M. Inglis, who will be primarily concerned with the sale of silicones in Australasia, India and South Africa. He is an Australian and recently visited the country on behalf of Midland Silicones Ltd.

USSR Belting Order for BTR

A RESULT OF MOSCOW TRADE FAIR

FOLLOWING negotiations during, and subsequent to, the recent British Trade Fair in Moscow, BTR Industries Ltd. has been awarded a further major order for conveyor belting of similar construction to the company's belts supplied in 1958 and at present in service in Russia.

The new Soviet order, for more than five miles of belting, is worth over £250,000. Deliveries will commence in September.

This belting — some of which will be over 78in. wide and of 14-ply construction, and up to 1⅛in. thick — will be used for carrying iron-ore and non-ferrous metals, and has been designed by BTR engineers to meet particularly stringent USSR specifications.

It consists of an all Terylene carcase with a nylon breaker and with specially compounded rubber covers for operating within a temperature range from 195°F. to – 58°F.

Other rubber and plastics firms are negotiating orders with Russia, springing from contacts made at the British Trade Fair. The International Synthetic Rubber Co. Ltd., of Hythe, for example, the UK's sole producer of SBR, is said to be carrying on negotiations with Raznoimport, one of the Soviet trade organizations.

UK belting is having a good measure of success in Russia. Another exporter to that country is Dunlop Rubber Co. Ltd., which recently completed an order for 6½ miles of similar belting, also for carrying ferrous and non-ferrous ores.

The BTR order is the second large belting contract announced by the company in six weeks. At the end of May the company stated that the National Coal Board had ordered over 4,500ft. of its new Tuflex fire resistant belting. This consists of a continuous filament stress member with a cotton cover warp and a continuous filament nylon weft and is stated to be 'a major departure from conventional methods of weaving fabric'. (*RPW* May 27, 1961.)

0.0003 Coatings

Telcon Plastics Ltd. will emphasize Telcothene (polythene) coating and lamination at the Packaging Exhibition at Olympia (September 5-15 1961). Special prominence will be given to the introduction of coatings down to 0.0003in. in thickness, which is expected to make a considerable difference in cost, and may lead to an expansion in usage of polythene coatings in particular.

Examples of the applications of a wide variety of Telcothene-coated and laminated materials will be demonstrated. These include the familiar multi-wall sack, which is now to an increasing extent being fabricated with a polythene-coated innermost wall.

Swedish Pipe Order

Engineers from a Swedish shipyard placed an £11,000 order for rigid thermoplastic pipe and fittings with Durapipe and Fittings Ltd. at the recent Interplas exhibition in London.

Exports from Ilkley

A new factory extension at the Spooner Dryer and Engineering Co. Ltd., Ilkley, Yorkshire, was opened by F. J. Erroll, MP, Minister of State, The Board of Trade, on Friday (July 14).

Spooners manufactures custom-built dryers and heat treatment equipment, some of its biggest customers being in the plastics industry.

Sharply Increasing Business

Two bays, having a floor area of approximately 25,000 sq. ft., will give the firm a 50% increase of potential output. Spooners states that the main reason for the extension is to allow it to cope with its sharply increasing export business, which already amounts to nearly 40% of its turnover. The presence of the Minister of State was due to this export success.

Foam and Springs Together

THE Marley Group is now producing moulded polyether foam plus springs as integral seating units, with the co-operation of the No-Sag Spring Co. The product is called Foamspring.

No-Sag springs are not a conventional type, but are made in a continuous serpentine strip which is formed and tempered into a circle; they do not become springs until stretched and anchored between two points. From then they tend to regain their original circular shape, thus giving a permanent arc; the serpentine formation permits accordion-like action with corresponding increased resilience and strength.

Marley states that 'Foam spring construction in furniture adds to the comfort and styling possibilities, and manufacturers can be assured of uniformity in their models and that there will be no slipping out of shape as is possible when using loose materials. . . . The use of foam springs [in cars] is economical because the number of separate items needed to produce a finished seat or back are reduced; this results in simplified ordering, handling and trimming'.

Tests have shown the system to have durability, and severe punishing has failed to remove the foam from the spring. The original moulding technique makes possible shaped foundations which, it is said, no other spring/foam system can produce; and the tubular frame can be bonded in, as well as the springs.

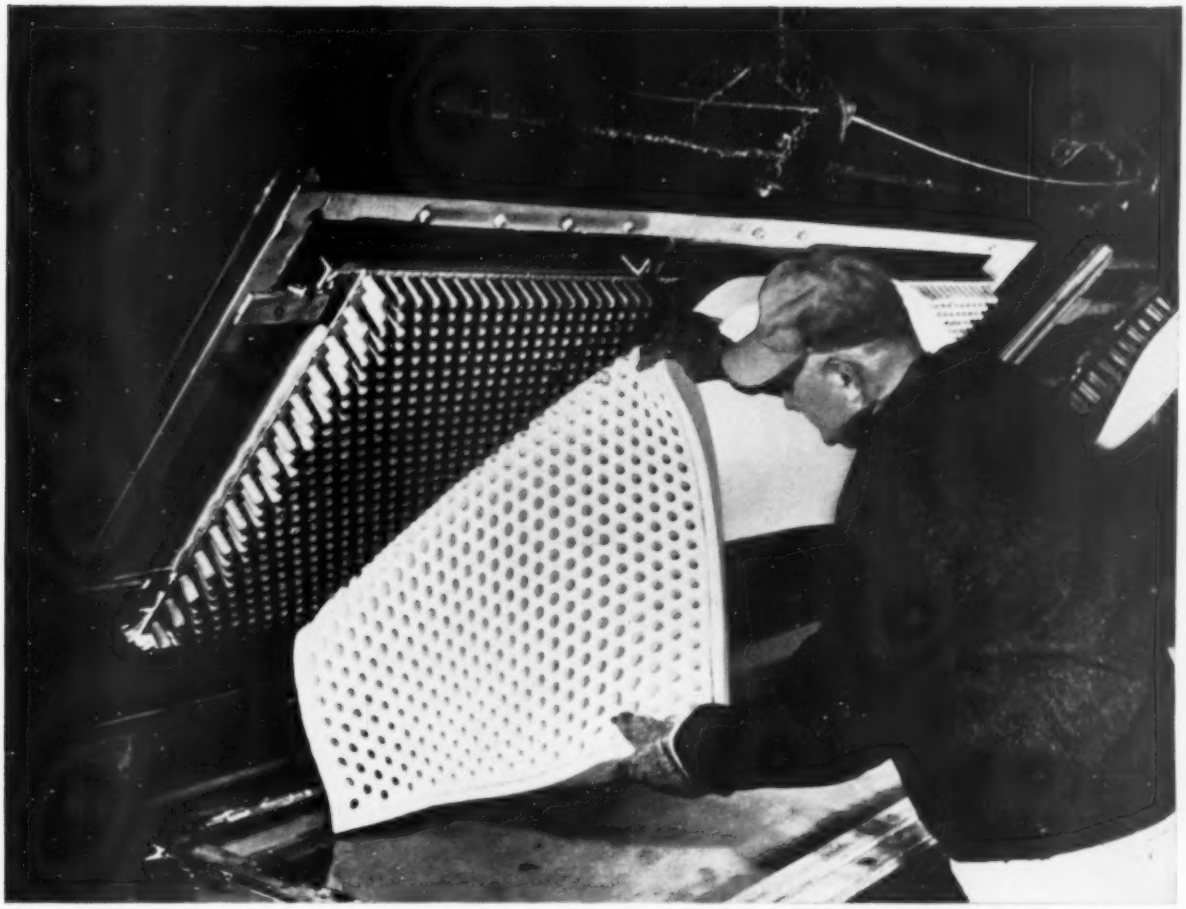
Butadiene in SRT

PROPERTIES of butadiene rubbers are dealt with in an article in the latest issue of *Soviet Rubber Technology*, a cover-to-cover translation of the Russian journal *Kauchuk i Rezina*, published this week. One of the conclusions reached in the article is that a more regularly constructed butadiene polymer synthesized with complex catalysts is superior to a lithium-catalysed polymer in its main properties (processing and tensile properties, abrasion resistance).

Thermal Sensitization

Other articles in this issue (No. 10) include: 'Thermal sensitization of natural and synthetic latices'; 'Study of the temperature distribution in the vulcanization of large rubber articles by means of an electrical analogue'; 'Mechanism of the sealing of flange connexions with rubber gaskets'; 'Problems in the construction of apparatus for the mechanical testing of rubber'; 'Ways of improving the organization of synthetic rubber works'; and 'Automatic equipment for removing the curing bags from motorcycle tyres'.

Soviet Rubber Technology is produced with the support of the Department of Scientific and Industrial Research, and in collaboration with Maclaren and Sons Ltd. (publishers of RUBBER AND PLASTICS WEEKLY) by the Rubber and Plastics Research Association of Great Britain, Shawbury, Shrewsbury.



New cushion against rising costs

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STABILIZERS FOR PVC — PART 3

Metal Salts and Soaps

LEAD COMPOUNDS STILL THE MOST WIDELY USED

By W. S. PENN, BSc

This is the third article in a series of six and deals with stabilizers in groups I and II of the classification described in the first article. The remainder of the series will describe other stabilizer types, give an outline of the commercial products available in the UK and consider recent developments

TWO series of stabilizers are considered in detail in the present article. These are the stabilizers of Group I which contains nine lead compounds including salts (without significant lubricant properties) and soaps (with certain lubricant properties) and the stabilizers of Group II which includes salts and soaps of calcium, cadmium, barium, zinc, aluminium, lithium and strontium. The organo-tin stabilizers and the mixed metallic stabilizers will be considered in the next article.

In the main it is proposed to consider the general properties of each group and then describe each stabilizer individually. In the case of Group II, the properties of each metal type (whatever the acid radical) will be considered, but as individual stabilizers. The characteristics of mixtures of these metal stabilizers will be considered under Group V. A list of stabilizers considered is given in Table 1.

TABLE 1
GROUP I AND II STABILIZERS

Group I
Basic lead carbonate
Tribasic lead sulphate
Dibasic lead phosphite
Lead silicate
Lead salicylate
Lead stearate
Dibasic lead stearate
Tribasic lead maleate
Dibasic lead phthalate

Group II
Calcium (stearate)
Cadmium (laurate and stearate)
Barium (stearate and ricinoleate)
Zinc (stearate, laurate, octoate)
Aluminium (stearate)
Lithium (stearate)
Strontium (stearate and laurate)

Lead Stabilizers

These are the most common stabilizers for various reasons. First they are cheap, second they are effective all round materials and third they have behind them a long history which has proved their value.

Unfortunately the lead compounds have certain obvious limitations. They should not be used for instance where ingestion is possible and this should include such products as children's toys. Again they cannot be used where sulphide staining is likely to occur; some can only be used in opaque compounds, a few in translucent compounds and none in really clear compounds.

Another and less expected place of exclusion is the use of highly basic lead stabilizers with aryl phosphates. Tribasic lead sulphate is particularly excluded. Suitable lead salts, however, can be used but often the choice will be another type of stabilizer altogether.

An important general point is that some care must be exercised in calculating the amount of lead stabilizer which can be used in a compound. Only the 'basic' part of the stabilizer should be used as exemplified by basic lead carbonate which contains 86.3% of lead as PbO but not more than 28.8% is 'safe' for reaction. If this figure is exceeded then carbon dioxide will be liberated and gassing will result. The safe proportions of various lead stabilizers are given in Table 2.

TABLE 2
CHARACTERISTICS OF LEAD STABILIZERS

	Specific gravity	PbO (total)	Safe PbO	Quantity to use (on 100phr)	
White lead	6.4—6.8	86	28.8	Extrusion	3—5
				Rigid extrusion	8—10
				Calendering	3—5
Tribasic lead sulphate	7.0	86	65	Extrusions	3—5
Dibasic lead phosphite	6.7	89.5	60	As for white lead	
Lead silicate	2.67	89	66.5	Extrusion	5—7
				Calendering	4—6
Lead stearate	1.24	31.5	31.5		1.5—2.5
Dibasic lead stearate	1.9	55	36.5	Used alone	2—3
				Used in combination	0.5—1
Tribasic lead maleate	6.0	89	66.5		2—4

It should be noted that on the basis outlined above PbO (litharge) would be the most efficient lead 'acid acceptor'. Unfortunately the oxide is neither light nor colour stable and therefore can only be used in a few black pigmented compounds. In general it is advisable to avoid using it.

Toxicity

One final and important point should be mentioned regarding the processing of lead stabilizers. They are, of course, highly toxic and their use in the form of dry powders is extremely dangerous. They should only be used as such where really efficient extraction and ventilation systems are available. For the average user it is advisable to use predispersions in plasticizers and this subject is considered in a future article. Here it is sufficient to state that quite a number of these dispersions are available commercially.

Group 1A Stabilizers

The stabilizers in this group may only be used in opaque compounds.

Basic Lead Carbonate

This is the most common of all stabilizers and is comparatively low in cost. It is also very often known as 'white lead'. The material has excellent all-round properties and it is used particularly in solid products. It has very good electrical properties.

Tribasic Lead Sulphate

This is very similar to white lead but is more particularly recommended for flexible and rigid extrusions. It is also more suitable for electrical applications.

Dibasic Lead Phosphite

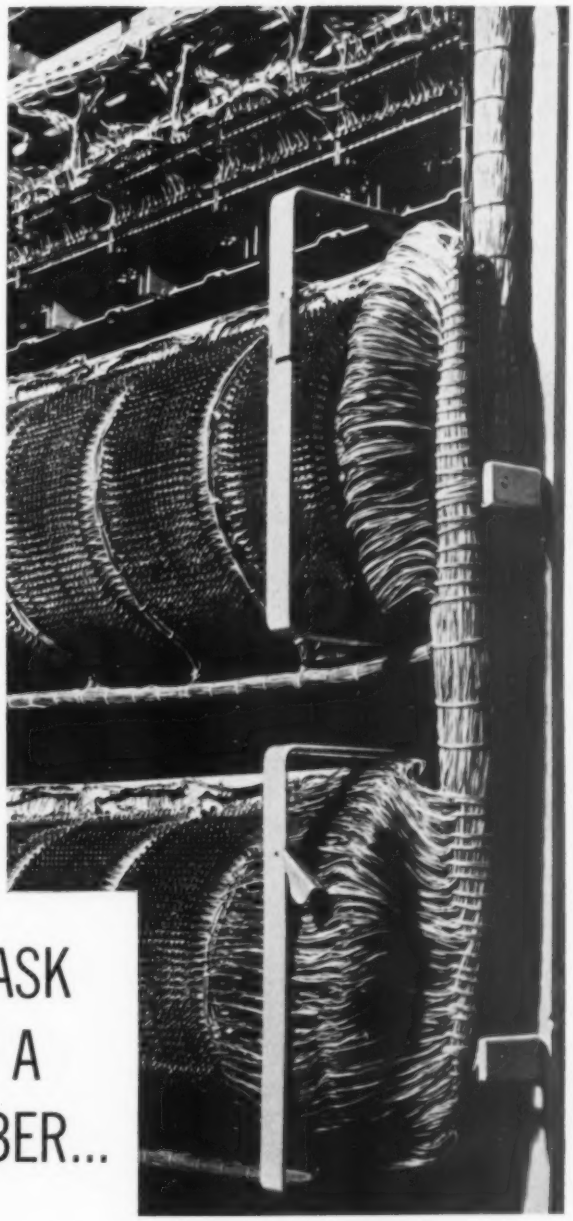
This is one of the best lead stabilizers good for both heat and light protection. It acts as a screen for UV light and has antioxidant properties.[1] It is particularly useful in pastes.

Group 1B Stabilizers

All the compounds in Group 1B give some degree of translucency.

Lead Silicate

A good stabilizer which may be used in compounds having reasonably good translucency. It is also used in



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Lead Salicylate

This compound is primarily a light stabilizer. It prevents the development of the blue colour due to iron impurities in asbestos and is thus widely used in floor tiles. It is normally employed with a heat stabilizer of which basic lead carbonate is the most common.

Lead Stearate

This is quite a widely used general purpose stabilizer for extruded, calendered or moulded products. It has strong lubricating properties which influences its use a great deal. It is used in proportions of 0.5-1.5 phr but above 0.75 phr will not give clear compounds so that dibasic lead stearate should be used. Lead stearate also gives good results when used with calcium and strontium stearates.

Dibasic Lead Stearate

This stabilizer is very useful, since it does not melt at normal processing temperatures. It therefore retains its efficiency as a lubricating agent without 'blooming' to the surface. Quite a number of other metallic stearates, when used above the equivalent of 1.5% stearic acid, cause excessive blooming and the point must be watched.

An important use of the dibasic soap is in conjunction with normal lead stearate. When used thus in appropriate proportions it enables clear compounds to be obtained.

Tribasic Lead Maleate

This is quite a good heat and light stabilizer with UV light screening properties. It gives translucent stocks.

Dibasic Lead Phthalate

This stabilizer has properties approaching those of white lead including heat and light resistant properties. It will, however, give translucent compounds.

Group II Stabilizers

This group includes all the metal salts and soaps[2] except the organo-tin stabilizers. For the most part the stabilizers are soaps particularly stearates and laurates but they also include ricinoleates and oleates. Since so many of them are soaps, great care should be exercised in their use as the possibility of bloom exists with its effect on heat sealing and printing.

A suggestion was made in the first article of this series (*RPW* July 1, 8) that the Group 2 stabilizers could be divided into two groups, those having better heat than light stabilizing properties and vice versa. It is not proposed to adopt this classification since it is quite arbitrary and a division into toxic and non-toxic types could just as easily be made.

The main point is that they form quite a separate group to the lead compounds. The differences between Group 1 and Group 2 are not the same for each member of the group but more in Group 2 have certain outstanding properties (or lack of them) than in Group 1. Some examples of this type of difference are as follows from which the marked overall division can be seen.

Group I Stabilizers
(1) All are toxic.
(2) Only some can be used in translucent compounds.
(3) Most can be used alone.
(4) Most impart quite strong heat and light stability.
(5) All stained by sulphides.

Group II Stabilizers
(1) Many are non-toxic.
(2) Most can be used in translucent compounds.
(3) Many are best used as synergistic mixtures.
(4) Most have either heat or light stability, but not both.
(5) Some stained by sulphides.

Some useful properties of the non-lead stabilizers are given in Table 3.

TABLE 3
PROPERTIES OF NON-LEAD STABILIZERS

Stabilizer	Heat or light	Toxic or non-toxic	Quantity phr	Most commonly used with
Calcium stearate	heat	non	2.5 —3.0	Zinc stearate
Cadmium stearate	light	toxic	0.5 —1.5	Barium stearate
Barium stearate	heat	toxic	2.5 —3.0	Cadmium stearate
Zinc stearate	heat	non	0.25—1.0	Barium and calcium stearates
Aluminium stearate	heat	non	0.25—1.0	Barium and calcium stearates
Lithium stearate	heat	non	1.5 —2.5	Sometimes used alone
Strontium laurate	light	toxic	1.0	Lead and cadmium compounds

There are several general points which need to be known about Group 2 stabilizers. First, as indicated in Table 3 they are frequently used in synergistic mixtures. Second an epoxidized oil or ester such as Abrac 'A' and Lankroflex ED3 respectively are frequently used with these mixtures. In addition the use of chelators is quite common.

A third point concerns toxicity again indicated in Table 3. The British Plastics Federation has placed each stabilizer in a group indicating its suitability for use in compounds to be used in contact with food. Some further indication of this is given under individual stabilizer headings below.

Calcium Stearate

This was probably one of the first non-lead stabilizers used. It is difficut now to recall the exact reason for this but it is probably twofold. First the material is completely non-toxic and second it is a lubricant as well as stabilizer and it is often possible to use it without the addition of further lubricant.

It is quite widely used in the UK although not so much in USA, the principal attraction being its dual function of stabilizer and lubricant. However it is becoming increasingly recognized that stearic acid may be just as effective and the point should be carefully investigated.

The material has reasonable resistance to heat and light, although it is a better heat than light stabilizer. It is particularly effective in emulsion type polymers and will give translucent compounds. Because it is a soap the amount used must be carefully controlled or the usual blooming troubles will be experienced.

The non-toxic nature of calcium stearate makes it very popular in food applications. It is approved in this connexion by both the British Plastics Federation and the Food and Drug Authority in the USA. Although calcium stearate is often used alone, it forms a valuable non-toxic synergistic mixture with zinc stearate in the following formulation: calcium stearate 2.75phr, zinc stearate 0.25phr, abrac 'A' 5-7phr.

Cadmium Soaps

The two most important members of this series are cadmium laurate and stearate. Both of the stabilizers are toxic and both have much better heat than light stability. It is for this reason that the materials are rarely used alone but in synergistic mixtures which impart the necessary light stability as well. The most common co-stabilizer is barium stearate but lead compounds are used as well. A typical combination is as follows: barium stearate 2.5 phr, cadmium stearate 0.5-1.5phr.

Both the laurate and stearate may be used in translucent compounds but the stearate gives an almost water-white transparency. The stearate has very good lubricating properties which makes it useful for this purpose. Unfortunately it is often a handicap since if blooming is to be avoided it must not be used in quantities greater than 1phr. In such cases the laurate is to be preferred.

Barium Compounds

Apart from lead compounds and calcium stearate the barium compounds are probably used more than any other metallic salts or soaps. Their main use is in synergistic mixtures with other materials particularly cadmium stearate as indicated above.

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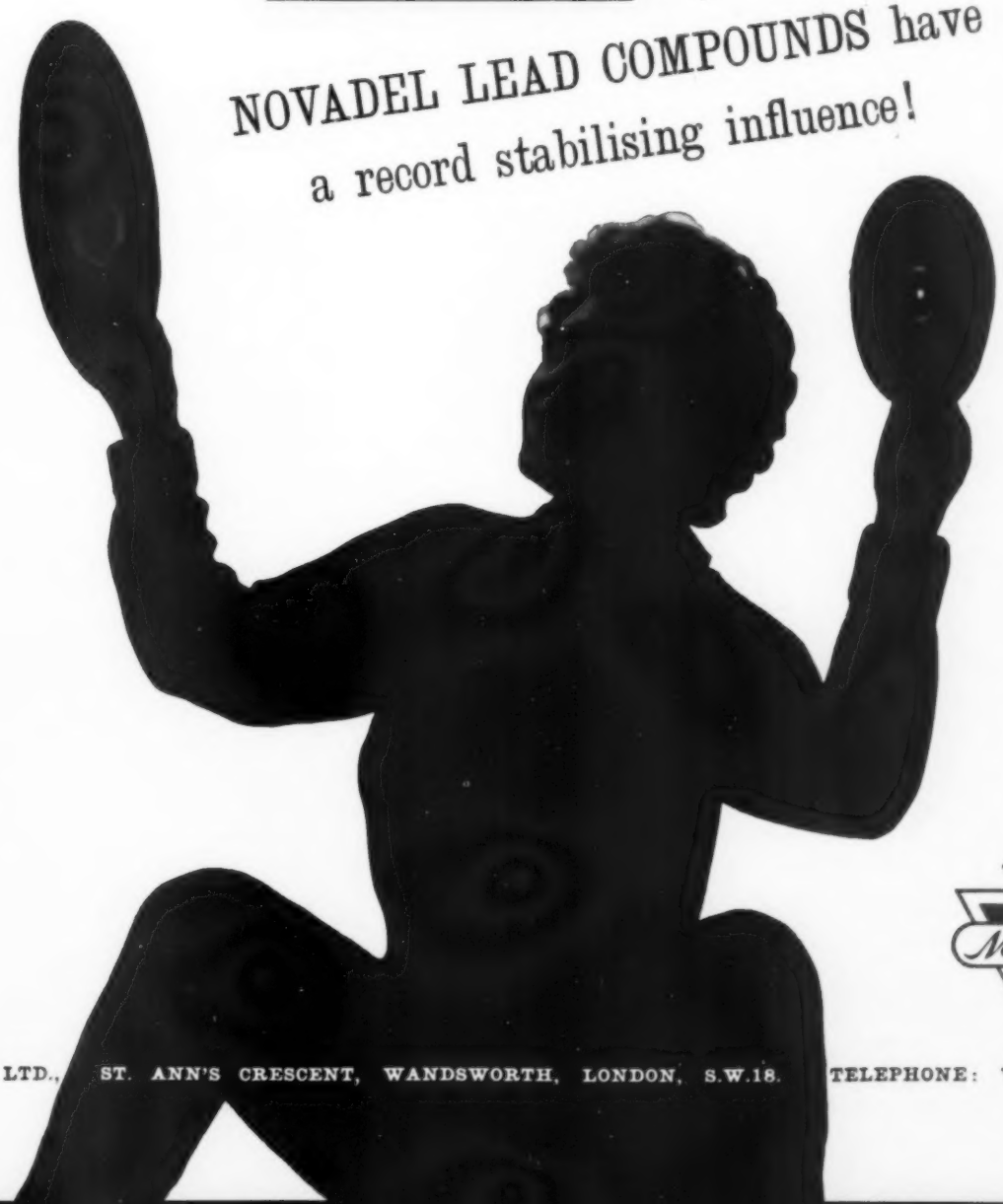

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Barium stearate (for example) is thus rarely used alone. It is an extremely good heat stabilizer but not so good from the point of view of resistance to light. It is therefore used in synergistic mixtures with zinc as well as cadmium often including an epoxidized oil and chelator. A typical formulation would employ 2.0-3.0phr of a 5 : 2 mixture of barium and cadmium compounds. Another formulation with zinc as the co-stabilizer is as follows: barium stearate 2.75phr, zinc stearate 0.25phr, abrac 'A' 5-7phr, triphenyl phosphite 1.0phr.

The synergistic mixtures described can be used in place of lead stabilizers where it is necessary to avoid sulphide staining. Another use is for stocks for high speed calendering which application is possible by virtue of the high melting point of barium stearate which therefore allows higher temperatures to be used.

Although the stearate is by far the most common barium soap, the ricinoleate is also used for similar purposes. However, only about one-half of the amount of stearate used is required. Barium compounds may be used in translucent compositions.

Zinc Compounds

These include zinc stearate, laurate and octoate but none are used alone for several reasons. Their individual stabilizing characteristics are not very good and up to 8phr would be required. Even then the compounds darken rapidly and can only be used under the mildest conditions. More important than this, however, is the catalytic effect zinc can have on pvc compounds. It can catalytically degrade the polymers unless used with certain other stabilizers. (Epoxy resins reduce the possibility of sudden darkening.)

Mixtures with the alkaline earth soaps and epoxy stabilizers are quite effective. The mixture with calcium stearate is very useful as a non-toxic combination.

Zinc stearate is replacing cadmium soaps for some purposes in barium/cadmium mixtures because of freer availability at lower cost. Only small quantities of zinc stearate (and other soaps) are required and are effective (0.25phr-0.5phr) larger quantities being less effective.

Aluminium Stearate

This soap behaves in a similar manner to zinc stearate.

Lithium Stearate

This is the only common lithium soap. It has some interesting features and in many instances may be regarded as a non-toxic substitute for barium, lead and cadmium soaps.

It may be used as a lubricant/stabilizer which accounts for one of its unusual properties. Many other metallic soaps yield cloudy products with phthalate type plasticizers although lithium stearate gives clear films. With phosphate plasticizers, however, it gives cloudy or opaque films.

This is a stabilizer which allows high calendering temperatures and therefore speeds to be used.

Strontium Soaps

The two most common strontium soaps are the stearate and the laurate. However they are not usually employed alone but in admixture with lead and cadmium compounds using 1.0phr of each. The compounds possess good lubricating properties and give clear and translucent stocks.

Conclusions

Although the number of different stabilizer combinations is growing rapidly the lead compounds are still by far the most widely used. In fact there is probably more basic lead carbonate used than all other stabilizers put together.

This sober fact demonstrates that when looking for a suitable stabilizer the lead types may well be considered first. In this connexion many of them will give translucent compounds. The main points of exclusion are toxicity and sulphide staining but otherwise they have wide application particularly in cable compounds.

The other metallic salts or soaps, excluding organo-tin compounds, have also been considered in detail. Although individual compounds have been described they are not used too often on their own, with the possible exception of calcium stearate. Nevertheless a consideration of their background properties is important for an understanding of their use in synergistic mixtures.

REFERENCES

[1] J. G. Hendricks and White, *Ind. Eng. Chem.*, 1951, **43**, 2335.
[2] H. Verity Smith, *British Plastics*, 1954, **27** (5), 176-179.

Part 4 of 'Stabilizers for pvc', which will appear next week, will deal with stabilizers of groups III, IV and V of the classification described in the first article of the series (*RPW* **July 1, 8**)

GRP Components for Chain Saw

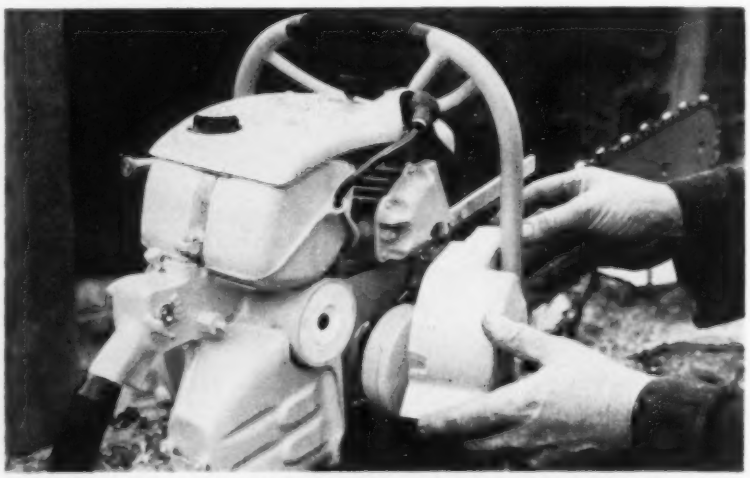
REINFORCED plastics has replaced conventional materials for the clutch cover of the Danarm direct drive chain saw. The clutch cover is match-die moulded by the Osma Plastics Ltd. industrial division. It is one of several applications which have been developed in conjunction with T. H. and J. Daniels Ltd. and the latter's associate company, J. Clubley Armstrong Danarm Ltd.

Polyester Protection

Polyester/glass was chosen for the clutch cover because its strength ensures protection both for the clutch mechanism and for the saw operator, as flying wood particles are retained by the cover.

The use of polyester/glass for the saw's engine cowling is still under consideration. Specially designed prototypes have already been produced and quantity production by matched-die moulding is being considered.

The chain speed of the Danarm saw makes cross-cutting possible and it will bore right through a trunk or felled tree and then cut up or down as required to avoid pinching.



Prototype engine cowling in polyester glass being fitted to the saw

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Structures of Natural Rubbers*

DIFFERENT BOTANICAL SPECIMENS SHOW REMARKABLE SIMILARITY

By F. W. STAVELY, P. H. BIDDISON, M. J. FORSTER, H. G. DAWSON and J. L. BINDER

Chemical and Physical Research Laboratories, The Firestone Tire and Rubber Company

ALTHOUGH Columbus, on his second journey to America, found the natives playing with balls which bounced and were elastic, it was almost 300 years before use was made in Europe of the gum used in these balls. Priestley found that it could be used for erasing lead pencil marks. However, when further applications of this material were attempted, it became recognized that rubbers from different parts of the country differed. These differences arose partly from the botanical origin of the plants from which the gum, or rubber, was collected and partly from the methods of collecting and preparing it. With the passage of time fine Para rubber came to be recognized and used as the best rubber and it held this position until it was supplanted by plantation rubber from Hevea brasiliensis trees.

Faraday's Analysis

These differences in rubbers from different sources made it necessary for the user to know more about the material. Even the distinguished physicist Faraday became involved in the problem and in 1826[1] he published an analysis of the latex and also the dry rubber. His results were as follows:

	Latex %	Dry rubber %
Rubber	31.3	72.65
Vegetable albumen ..	1.8	4.35
Bitter material rich in nitrogen	7.33	16.35
Extractable matter ..	2.90	6.65
Water	56.67	—

Thus determinations of the moisture content, the acetone extract of soluble non-rubber constituents, the nitrogen content to indicate the amount of protein and the ash to indicate soil and other contaminants were used to differentiate between different rubbers. Faraday's analysis is rather typical of Para rubber prepared by evaporating latex on a pole slowly rotated over an open fire. Plantation rubbers, prepared by sheeting or creping, or washed rubbers generally have smaller amounts of non-rubber constituents. The differences in physical properties and the differences shown by the above type of analysis resulted in the grade classifications of commerce.

Distillation Method

Analyses, such as the above, offered no information about the obvious differences between rubbers of the para type and those like balata. Probably Himly[2], in 1835, was one of the first to investigate the constitution of rubbers. From the destructive distillation of 19 different samples of rubber from different botanical sources, he found the same distillation products and in the same quantitative proportions. Ten of these rubbers are described as: Siphonia Cahucu, Siphonia elastica, Castilleja elastica, Cecropia peltata, Hippomane biglandulosa, Lobelia Caoutchouc, Ficus religiosa, Ficus indica, Ficus lymphaeaefolia and Artocarpus integrifolia. Hence it seemed that the basic constituents of all these rubbers were the same.

Still the differences between gutta, balata and chicle, which are types of rubbers of commerce, were not explained (even though it was known that the rubber hydrocarbon was C_5H_8) until these materials were studied by x-rays. Then it was found that, since there is one double bond for each C_5H_8 unit, balata exists in the *trans*-1,4, configuration, whereas Hevea is in the *cis*-1,4 configuration. Chicle was found to be a mixture of the two. Further improvements in the structure determinations, made possible by infrared spectroscopy, have shown that Hevea is not completely *cis*-$C(CH_3)=CH$- but contains 2.2% of $CH_2=C(CH_3)$- structure while balata contains 1.3%. This latter structure, in synthetic polyisoprenes, arises from 3,4 addition [3].

Microscopic Examination

Since the rubber, as obtained from the plant, is in the form of a latex, early investigations of the latex were carried out with the light microscope. The Brownian motion of the particles, particle shape and size and particle size distribution were investigated with several latices. With the development of the electron microscope it became possible to study the particles in the latex in greater detail and this was done for the readily available latices.

Heretofore, most of the newer analytical methods have been applied mainly to Hevea, balata and Chicle since these are important substances of commerce and are most readily available. LeBras[4] has discussed some properties of some of the less well-known rubbers. It was the purpose of this investigation to apply some of these methods to less well-known rubbers and latices in order to determine their similarities to the better-known rubbers.

Experimental Work

When possible the plants were tapped and the latex collected as is done with Hevea. The latices were stabilized with ammonium hydroxide or Santobrite.

The particle size distributions of the latices were determined from electron micrographs of the latices. Standard procedures were used for brominating the particles and photographing them. The results on the particle size data are given in Table 1 and electron micrographs in Fig. 1.

TABLE 1

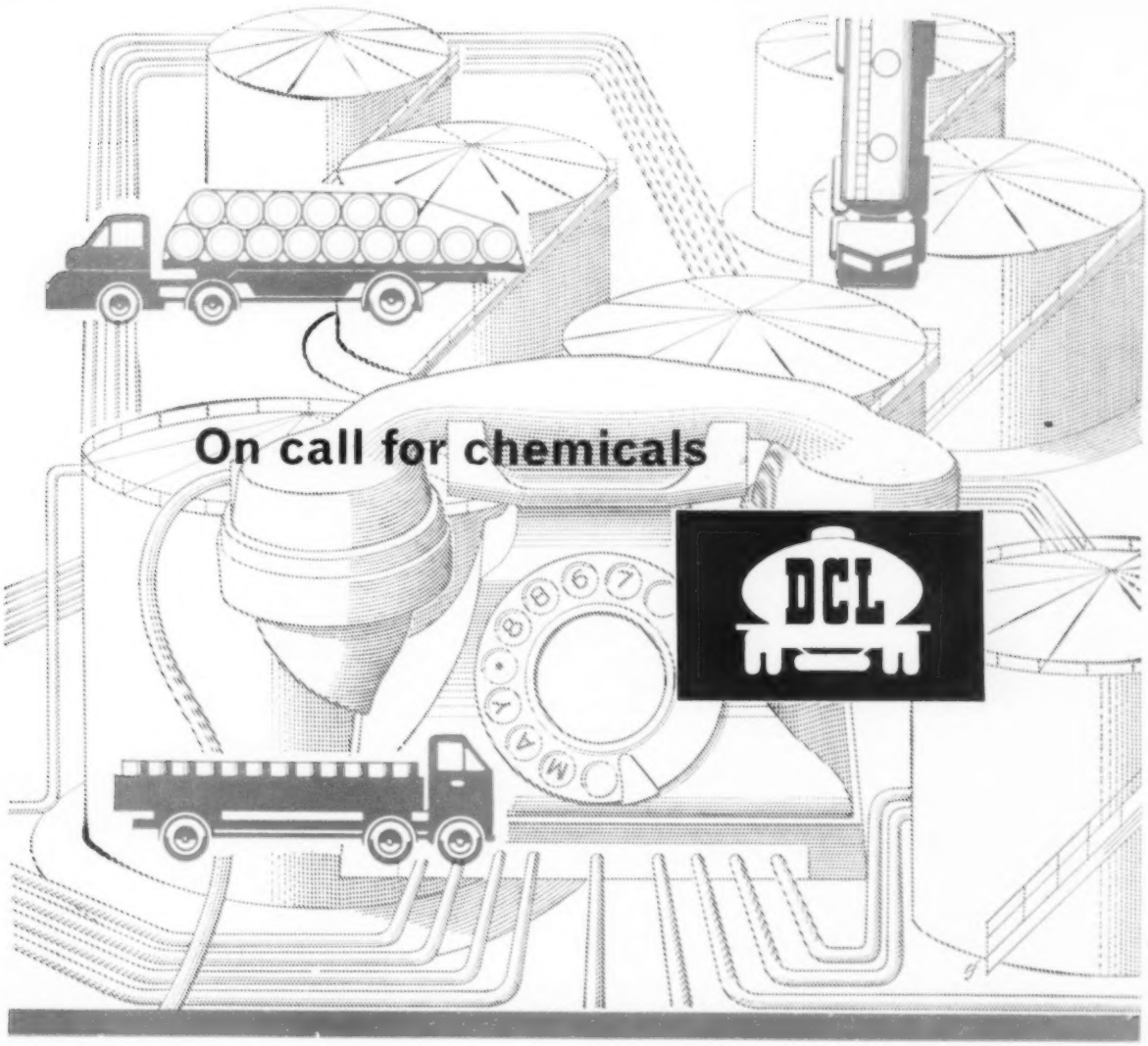
PARTICLE SIZE DATA FOR LATICES OF NATURAL POLYISOPRENES

Latex	Particle range, Å	Mode, Å
Hevea brasiliensis	1,000—15,000	1,200
Alstonia scholaris	1,300— 5,300	3,300
Castilla elastica	540—17,400	Not defined
Cryptostegia grandiflora	800— 9,600	2,000
Ficus elastica	430—25,600	1,730 and 10,400
Funtimia elastica	860— 5,000	2,500
Landolphia specie	650—20,000	1,620
Manihot glaziovii	600— 1,800	1,200
Mascarenhasia elastica	200—10,000	1,400 and 200
Palaquium philippinensis	25,600	—

Samples for determining the microstructures and x-ray diffraction photographs were obtained from the

Continued on page 91

*This paper was presented before the Rubber Division of the American Chemical Society at the Louisville meeting, April 19-21 1961.



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VIEWS *and* REVIEWS

Popular Science

IF there was such a thing as a 'Popularization of Science' medal, it should go to Maurice Kaufmann, a senior lecturer at the National College of Rubber Technology, for his lecture 'Newer Ways of Making Polymers — a Guide for the Non-chemist'. This was delivered before the London and District Section of the PI last January, and is published in the latest (June) issue of the Journal of the Plastics Institute.

Mr Kaufman is an ideal lecturer; he knows his subject and he knows how to put it across. The marks of a perfect teacher are to know what to say and how to say it. In this lecture, he was talking chemistry to non-chemists, and succeeding. I read it all, although I knew all the facts, because I learned a lot from it about writing for the non-expert.

A lot of nonsense is talked about popularizing science. It can be bad but in some form or other it is necessary — if only to teach our rulers. The scientist must communicate: first, with his colleagues and peers, but also with the rest of the world. There are some scientists who take up a 'medicine man' position and resist any attempt to penetrate their secrets, perhaps to give the impression that they know all there is to know. Fortunately they are few.

Science and Democratic Government

Most practising scientists realize that they are governed by non-scientists who must somehow be made to understand what the scientist is aiming at, if government in this technological age is to be realistic and progressive. This is a particularly difficult thing to do because the politician is afraid of science and will run a mile to avoid it.

The sensible approach is to follow the line which has given to science, technology, and industry their immense powers: the line of specialization and division of function. That is to entrust scientific communication to a specialist in communication.

Mr Kaufman is such a specialist. If in this lecture he may be said to fall occasionally between the two stools of writing for the non-expert and for the non-scientific, that is not very serious; it does not detract from his overall achievement. If I spend a little time on this shortcoming, it is just because his virtues are clear enough to all who read this admirable lecture.

Dramatic Dangers

Mr Kaufman has a faculty for unobtrusively engaging interest by making his technical discourse into a story, by using a dramatic technique. To the reader or listener, this gives a sense of immediacy, almost of personal participation, which keeps him not only interested but actively engaged.

Remembering, however, that the lecture is addressed not to non-scientists but to non-chemists, I think Mr Kaufman goes too far with this excellent teaching method. He courts the danger of antagonizing the educated reader by an appearance of patronizing, or even of insulting him by rating too low his knowledge and intelligence.

I began to be a little restive when polymerization was explained by the simile of dancing couples uniting into chains by clasping free hands, but when the Magic Fairy Free Radical was introduced, I shuddered. The author himself calls it a 'rather dull fairy tale' but I do not think he believes it because he is too subtle a writer to deliberately let anything dull into his bright story, so I suppose the simile ran away with him. And similes too often do that; they lead you where you do not want to go.

A Classroom Cliche

A more subtle criticism is the continuous use of the pedagogical 'we'. In illustration of one of the dangers of 'we-ology', I remember the late Dr D. F. Twiss remark after one lecture that he had been alarmed to hear the lecturer say ' . . . and so we were left inside the flask with a thin film of rubber', and he trusted that the lecturer now felt no ill-effects of his confinement.

Apart from its being a slovenly classroom device, the 'we' is both confusing and antagonizing. Sometimes it means 'you and me', sometimes 'us here at this lecture', sometimes 'us teachers', sometimes 'polymer scientists', sometimes 'mankind', and so on. Our language is rich enough to allow us to choose the accurate word and scientists especially should exploit it.

'We' has a psychologically antagonizing effect, too, because it tends to suggest to the listener that he is not part of the select coterie represented on this occasion by the lecturer. 'We have hitherto had little control over . . . ', 'it was only from about 1930 onwards that we began to understand . . . ', 'we still have much to learn but . . . ', 'our methods have been rather crude but . . .', 'we cannot assign weights to these but we might say . . .'.

These and others combine to induce a suggestion of the superiority of the lecturer and so lessen the intended impact of the lecture. It can grow even more marked if the first person plural is unconsciously supplemented by the use of the second person. A paragraph beginning: 'If you consider the process whereby a molecule joins a chain, you will see that it can do so in one of several ways' and ending: 'This we call istotactic.' unconsciously puts the listener in his place.

The truth is that the personal touch in technical exposition can be a simplifying and unifying technique when used consciously, deliberately, and sparingly but when it degenerates into the habit of a classroom cliche, it can be disturbing and irritating. This kind of language often carries over from teacher to student who repeats it in an examination paper or laboratory report, and is dealt with accordingly.

Pointed Elegance

I have used Mr Kaufman's lecture rather as a peg for a discussion and I would not like to give the impression that he is a bad writer. On the contrary, he has on occasion an attractive elegance and pointedness. Some quotations show this: 'This brief treatment has the merit of quickly passing over our areas of ignorance'. . . . 'Nature is very skilled at making polymers. She makes them with an ease, an elegance and a precision which show that we still have much to learn'. . . . 'Chains can be broken in many ways. In fact, whenever sufficient

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

energy can be concentrated on the chemical bonds they will snap'. . . . 'The main chain stays intact but a piece is chipped off the edge and the branch grows from there'.

Examinations and Teaching

Another contribution by Mr Kaufman to the June 1961 Journal of the Plastics Institute is a letter dealing with the correspondence in the April and February issues arising from some comments made by Dr Child, as chairman of the Examinations Committee of the PI. Dr Child expressed concern on two matters: the low standard of many students in plastics technology and their inability to express themselves adequately. He said that it was essential to raise the general standard and, to do this, the Institute must continue its efforts to help the teaching establishments. A similar state of affairs was reported last year by the IRI.

Mr Kaufman sees the problem of illiteracy going deep into our educational system, to stem from the increasing specialization which starts in school at the age of seven with the streaming for the 11-plus examination, and continues to the sixth form and later specialization 'which cannot but turn out educationally unbalanced students'.

It is too late, he thinks, for anything but first aid, and suggests that the Institute let the colleges know that in future they will be paying more attention to the ability of the student to express himself and that therefore the colleges should somehow, however difficult, make provision for it in their teaching.

General Principles or Process Details?

Mr Kaufman's second point is more controversial and, in view of the coming co-operation in examinations between the PI and the IRI (reported in the IRI Proceedings, April 1961, Vol. 8, No. 2, pp. 36-8) it will concern both of those bodies.

Mr Kaufman says: 'On the second of Dr Child's criticisms, the low standards in plastics technology, I think we shall make some progress if we teach principles rather than details. But this requires not only some careful thought in the colleges, it presupposes a change on the part of those who dictate the shape of the examination, the Institute and the industry. If the examiners will not ask for fiddling details of processes that are operated today but which will be modified tomorrow and if employers will not expect their raw technologists to have off pat a formulation for this and that compound in which they are particularly interested, then we shall find it easier to train people in the fundamentals of plastics technology'.

Most of us will agree that a good grasp of the general principles is of more value to a young man in our industry than a wide but superficial and unco-ordinated acquaintance with the details of ephemeral processes and esoteric formulations. Perhaps any disagreement among us would arise from trying to determine what is a fundamental principle and what a process detail.

IRI Examinations

For instance, in last year's IRI Associateship Examination in Rubber Technology II, the examiners, in question one, asked candidates to describe the manufacture of polyurethane foams for upholstery, and, on the 11 answers out of 37 candidates, reported: 'Most were poor, giving chemical reactions instead of compounding and processing technology . . .'. In question eight, candidates were asked to discuss the design of calenders for double coating of fabric and to describe with diagrams the method of use including safety precautions. The examiners reported on the 19 answers: 'The less said the better. Only a superficial bookish knowledge was displayed of one of the industry's major pieces of equipment'.

One of the two examiners here concerned is also a lecturer at the National College of Rubber Technology and so, if Mr Kaufman persists in his proposal — as I hope he does — a nice argument could be in prospect.

My contribution to it, for the present, is that, in common with the bulk of the other members, I believe, I would not give much for my chances of passing either examination as they stand at present, but I think I might scrape through if they were remodelled on 'general principles'.

Bright New Products

The word 'novel' is somewhat overdone nowadays but it is difficult to find a better for describing those new products one comes across which are a little more than the usual, stereotyped, run-of-the-mill 'developments'. If, then, I call them 'bright', it is intended to convey that I found them 'attractive', or 'striking', or 'thoughtful', or 'exciting', or, in a weary word 'novel'.

I take the following from that useful publication of the Rubber and Plastics Research Association, *Rubber Products News*.

Cornelius Chemical Co. 'Tranco 160 B'. Polyurethane coatings for wood floors in gyms., etc.

Wilmington Enamelling Co. 'Helithane 300', Polyurethane coating for patent leather.

University of Michigan. Coating granules of fertilizer with plastics, to reduce the rate at which soluble salts are leached out.

Ripple Sole Corp. Heel for walking casts to cushion the injured leg and avoid penetration of the plaster.

Goodyear. Extruded, 24in. diameter tubes, 8 or 12ft. long, weighing 175lb. per linear ft. as dock fenders.

Du Pont. Increasing the velocity of exhaust gases from chimney by means of a nozzle with a flexible seal of Viton and Teflon.

Trelleborg. Spraying a synthetic-rubber, sealing compound on to the joints of prefrabricated concrete houses.

Union Carbide. Gravity-feed, portable car-washer, consisting of a polythene bucket, filled with water and placed on roof of car, with flexible pipe from it to a water-brush.

Dunlop. Cricket pitches mixed from compounded latex and laid on site.

Envopak Ltd. and I.C.I. Mailing container of pvc-coated nylon fabric with zip fastener and lock.

Sears Roebuck. Luggage moulded in polypropylene.

R. A. Brand and Co. Engine protectors of glass cloth in polythene.

Mercedes-Benz. Foam-rubber dummies, with built-in instruments, in seats of cars being tested for effects of head-on collisions, smashes and somersaults.

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STRUCTURES OF NATURAL RUBBERS

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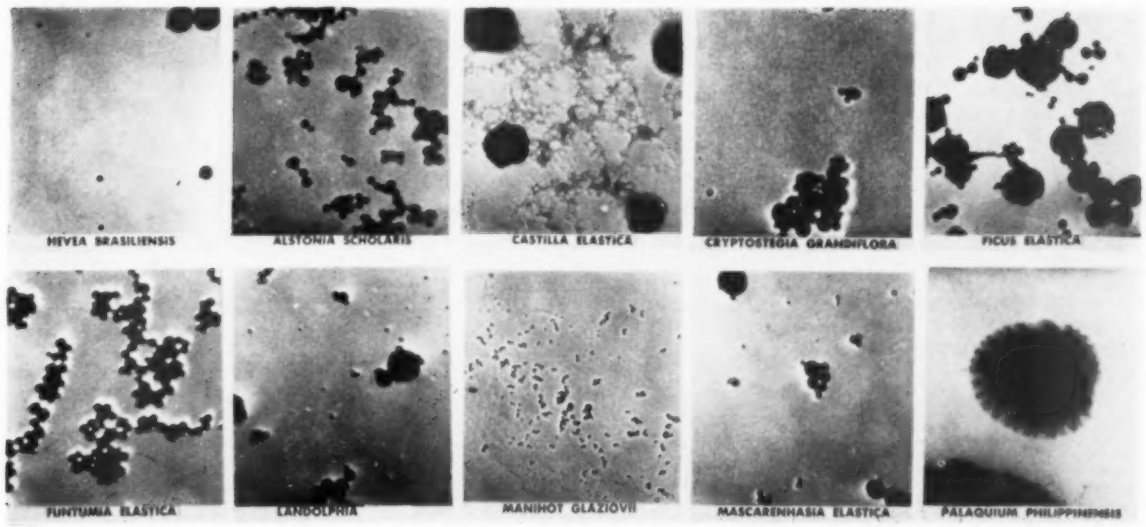

Fig. 1. Electron micrographs of some of the rubbers

latices, by coagulating in alcohol and then dissolving the coagulated material in toluene. Other samples of crude rubbers were dissolved in toluene and insoluble material filtered off. The clear toluene solutions of the polymers were digested with hot 5% HCl solution to remove protein. Care was taken to exclude air during the digestion. It is also necessary to have an antioxidant present during the digestion and prior to coagulation to prevent degradation. With some samples, hot 5% NaOH solution was used for the extraction because it was found that the emulsion which formed was easier to break. The digestion was carried on, periodically changing the acid or alkali solution, until the aqueous layer did not become coloured. The aqueous layer was then separated and the polymer in the toluene layer coagulated in acetone. The coagulated polymer was re-dissolved in toluene and again coagulated in acetone. The polymers were then dried under high vacuum and carbon disulphide solutions prepared.

The microstructures of the polymers were determined by the method described by Binder and Ransaw. The results are given in Table 2. There was an insufficient amount of Pallaquium philippinensis to purify for the microstructure determination but an infra-red spectrum was obtained and the polymer found to be *trans*-1,4.

Diffraction Patterns

X-ray diffraction photographs were made with the same samples used for determining the microstructures. Films of the polymers were rolled into cylinders about $\frac{3}{32}$in. in diameter, stretched at room temperature and then quenched in a bath at −70°C. The samples were maintained at dry-ice temperature while the x-ray photographs were made. The results of the x-ray determinations are also given in Table 2 and photographs of the diffraction patterns in Fig. 2.

Inherent viscosity and gel determinations of the coagulated polymers, for which sufficient material was available, are also given in Table 2.

Conclusions

Considering the variety of plants represented by the samples in Table 2, it is indeed impressive that most of them have the same microstructures as Hevea (97.8% cis-1,4; 2.2% 3,4). This raises the question whether all

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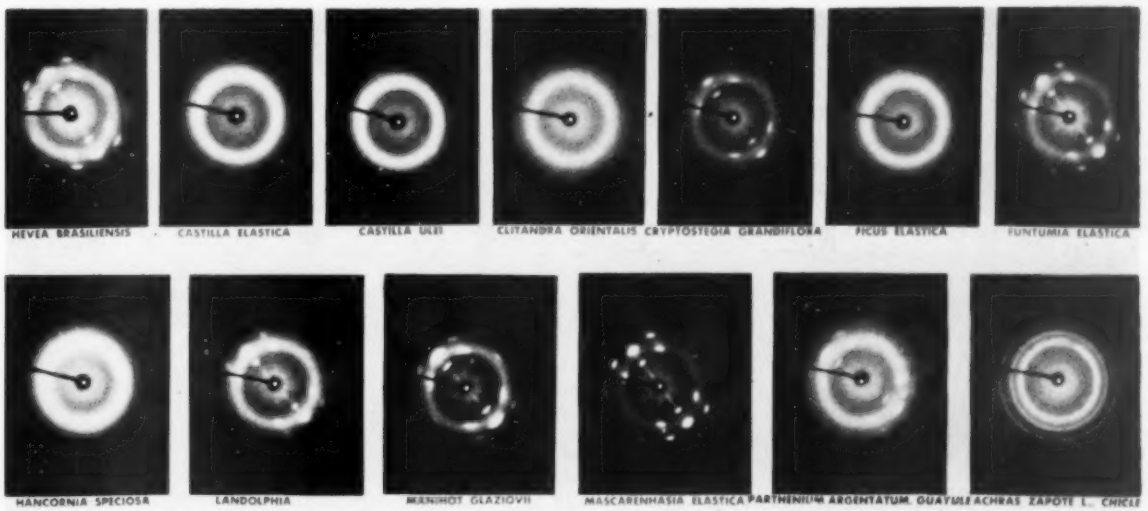


Fig. 2. X-ray diffraction patterns of the various rubbers

CORRESPONDENCE

Degradation of PVC

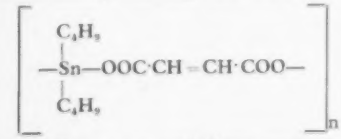
Dear Sir,

As Mr Penn's article 'Classification of pvc Stabilizers' in the July 1 issue is said to have 'laid the foundation for future articles', perhaps I may be permitted at this stage to offer some suggestions.

It is true, as Mr Penn has stated, that the mechanism of pvc degradation is imperfectly understood. It is unfortunate, however, that Mr Penn has made no mention of the greatest single problem in pvc stabilization, namely the very large difference in the reactions to stabilizers of the various different commercial grades of pvc polymer. These differences are thought to be due in part to the presence of residual catalyst, emulsifying agent, protective colloid, chain stopping agents, etc., and in part to inherent structural differences, in particular degree of chain branching, due to different methods of manufacture.

The old theory of polyene formation being the primary cause of colour development is evidently dying very hard, but it is based on extremely slender evidence and does not explain many observable facts in pvc degradation, notably the tendency of unplasticized compounds stabilized with a calcium-zinc system to degrade to a green colour.

As one who has been concerned with organotin stabilizers since their first introduction into the UK, I am surprised to find them described as 'among the newcomers'. In fact organotins were produced in England before the modern liquid barium-cadmium types and their manufacturing history in the US goes back into the early 1940s, which is long before the introduction of the modern synergistic barium-cadmium stabilizers. The terminology of organotin chemistry is now widely known and it is incorrect to refer to 'alkylated tin salts' or to 'tin mercaptide', which is not a chemical compound at all. For the sake of accuracy it might be as well to point out that dibutyl-tin dimaleate does not exist, the product manufactured for use as a stabilizer is poly(dibutyltin maleate), having the structure:



Finally, as a stabilizer manufacturer, I am sure that all my competitors will join with me in wishing that Mr Penn's estimate of 4phr as the average use of stabilizers was correct. In fact some of our new organotins are so efficient that our customers, so far from having their enthusiasm dampened by the high price, are using them at doses as low as 0.4phr because of the low cost of such a system relative to a liquid barium-cadmium system.

Yours faithfully,
H. VERITY SMITH,
Managing Director.
Meister AG,
Basle, Switzerland.

W. S. Penn writes:

I am grateful to H. Verity Smith for his illuminating remarks on the first of my articles 'Stabilizers for Pvc'. It is useful to have the benefit of his expert knowledge, although I fear that all his views are not shared by every stabilizer producer.

With regard to his point on the reactions of stabilizers to various pvc polymers, this is, of course, most important and the subject is mentioned in a later article. As far as the theory of polyene formation is concerned and its responsibility for colour development, it may have been stressed too much but light absorption studies appear to indicate that it is one of the mechanisms. As I wrote, however, the mechanism is imperfectly understood and much more work is required on the subject when perhaps these rather nebulous theories will be placed on a sounder footing.

As Mr Smith rightly points out, organotins are hardly newcomers. However, people still tend to regard them in this light and it is perhaps only in recent years that they have been adopted with some enthusiasm.

Mr Smith also refers to terminology and he is, of course, correct. Nevertheless, 'alkylated tin salts' and 'tin mercaptide' although incorrect, are perpetuated by some suppliers and have come to have a certain meaning, however unfortunate this might be. Again, it is widely known that DBTM has a polymeric nature, but even so, 'dibutyltin maleate' is commonly used and is to be found in Mr Smith's own excellent summary 'The Development of the Organotin Stabilizers', published by the Tin Research Institute. I only mention this to illustrate the difficulties of nomenclature.

With regard to the usage estimate, it is freely admitted that it is extremely hazardous to make such 'guestimates', However, Mr Smith will be the first to admit that his 0.4phr is low and not an average figure. Moreovet, my figures only referred to the UK where basic lead carbonate is still the most commonly used stabilizer to the extent of 4.6phr, barium/cadmium is used say, at 2.0phr with 0.5–1.0 organic phosphite and epoxy stabilizers are used to the extent of 5-7phr. If these figures are averaged out, taking the usage of each type into account, then a figure of 4phr or perhaps a little lower may not be too far out. In the publication by Mr Smith, referred to above, he mentions a figure of 3-4% for organotin consumption which will hardly affect the average very much in *weight* although in value would be a different matter.

Stabilizers for PVC — 3: page 80

A Degree of Snobbery?

Dear Sir,

As I have a son who has just taken his finals for the 'Dip. Tech.', I feel impelled to say how much I appreciate the remarks contained in your editorial of May 27.

I find that amongst those who are in a position to judge, the Diploma in Technology is considered to be not merely equal to, but superior to, an Honours Degree, since the course of studies covers a much wider field, and provides for practical application of the principles involved.

It is, therefore, a matter for regret if a snobbish regard for the magic word 'Degree' amongst top management should result in favour being shown to those whose training is mainly theoretical. Therefore, anything the press — particularly the technical press — can do to change this state of affairs will be well done.

Yours faithfully,
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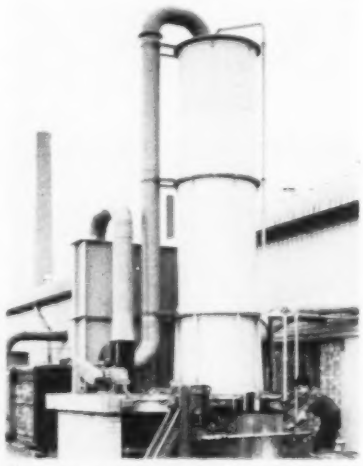
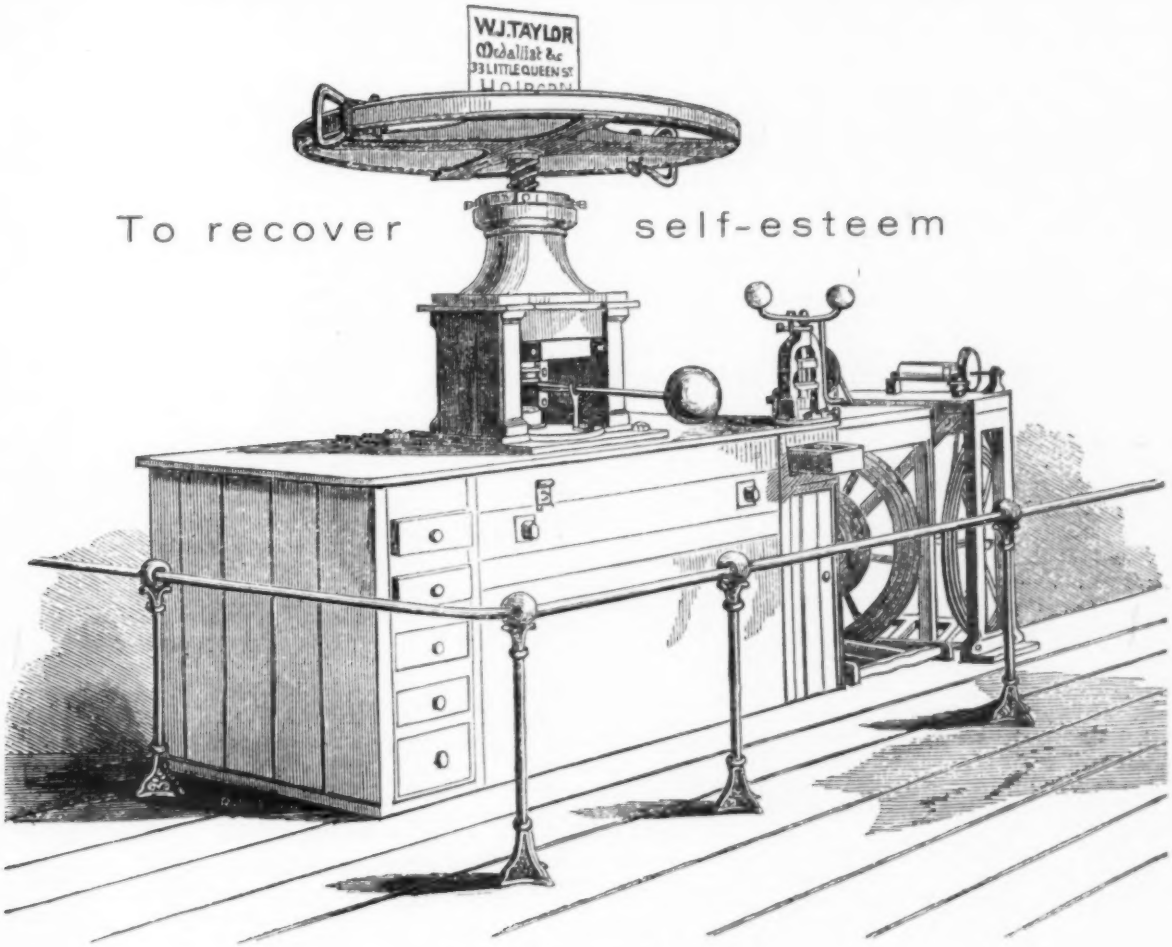
Export Sales Manager.
P. B. Cow (Li-Lo) Ltd.



An 18ft.-high scrubbing tower, together with its eliminator, made by Plastic Filters Ltd. of Sussex, for Johnson and Sons Smelting Works Ltd., Enfield. The equipment handles hydrochloric-acid gas and other miscellaneous gases at temperatures up to 110 C., and is fabricated from Vybak (pvc) industrial rigid sheet, bonded to an outer casing of polyester glass laminate



TAYLOR'S MEDAL MACHINE

Do you prefer decorations to dividends? Or would honours seem too abstract? If your firm uses solvents, and is not recovering them, the very mention of Active Carbon Solvent Recovery by Sutcliffe Speakman in the right quarter is likely to bring both cash and kudos. Sutcliffe Speakman will either tell you how to recover solvent at a profit, or will tell you it cannot be done. Just to contact them probably rates a medal: for shining common sense.

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MEN and MATTERS

A Review of People and Events

by Peter Richards

HOW much do your employees know about your business? Or, alternatively, how much do you know about the concern that provides you with your bread and butter?

In recent years enlightened firms have provided annual statements for their employees. But it is little use putting up a notice saying 'the statement can be inspected in the chairman's office'.

Laporte Industries Ltd. made quite certain this week that each of its 6,500 employees received a copy of the chairman's statement — it was attractively presented as a special issue of the group's magazine *Laporte News*.

In an introductory message to employees, the Laporte chairman, Patrick O'Brien, recalls that the first issue of *Laporte News*, 11 years ago, had only some 1,500 readers. He writes: 'We are alive to the greatly increased importance which our growth puts upon our means of communications and the flow of information throughout the group. That is why I am anxious that you, as an individual employee, should receive my annual statement exactly as our shareholders do'.

While this is an excellent idea, I wonder if a condensed version of the statement would not have made more appeal to most employees?

Diene Pioneer

Dr F. W. Stavely, who controlled research into stereospecific synthetic rubbers at Firestone Tire and Rubber Co.'s Akron laboratories has retired from his position as director of research.

His duties have been taken over by Ernest T. Handley, formerly executive vice-president of the plastics and synthetic fibres division of the company.

Dr Stavely joined Firestone in 1922 and had been research director since 1945. His insistence on exploring the use of akali metals as catalysts led to Firestone becoming the first tyre company to produce diene rubbers commerically.

50 Years in Footwear

A fifty years' association with the footwear industry was broken recently when Cecil Hughes, assistant (sales) general manager of Dunlop Footwear Ltd., retired.

Mr Hughes joined the New Liverpool Rubber Co. in 1912. In 1928, two years after the company was taken over by Dunlop, the footwear export section was transferred to Liverpool and Mr Hughes went North to take charge. On the formation of Dunlop Footwear Ltd., in 1956, he was appointed assistant (sales) general manager and a member of the management committee.

Cariflex North and South

The plastics and rubbers division of Shell Chemical Co. Ltd. has appointed F. Davies and P. W. Jacob as rubber sales managers for the North and South Regions respecpectively.

Both Mr Davies and Mr Jacob have been actively concerned with the marketing of Shell's Cariflex rubbers since their introduction to the market early in 1958. Mr Davies, who is a committee member of the Manchester section of the Institution of the Rubber Industry, will operate from Manchester and Mr Jacob from London.

New BP Granbull Directors

Baker Perkins Granbull Ltd. has appointed two new directors: Norman Harwood (pictured right) and J. S. H. Rodman.

Mr Harwood, who was formerly

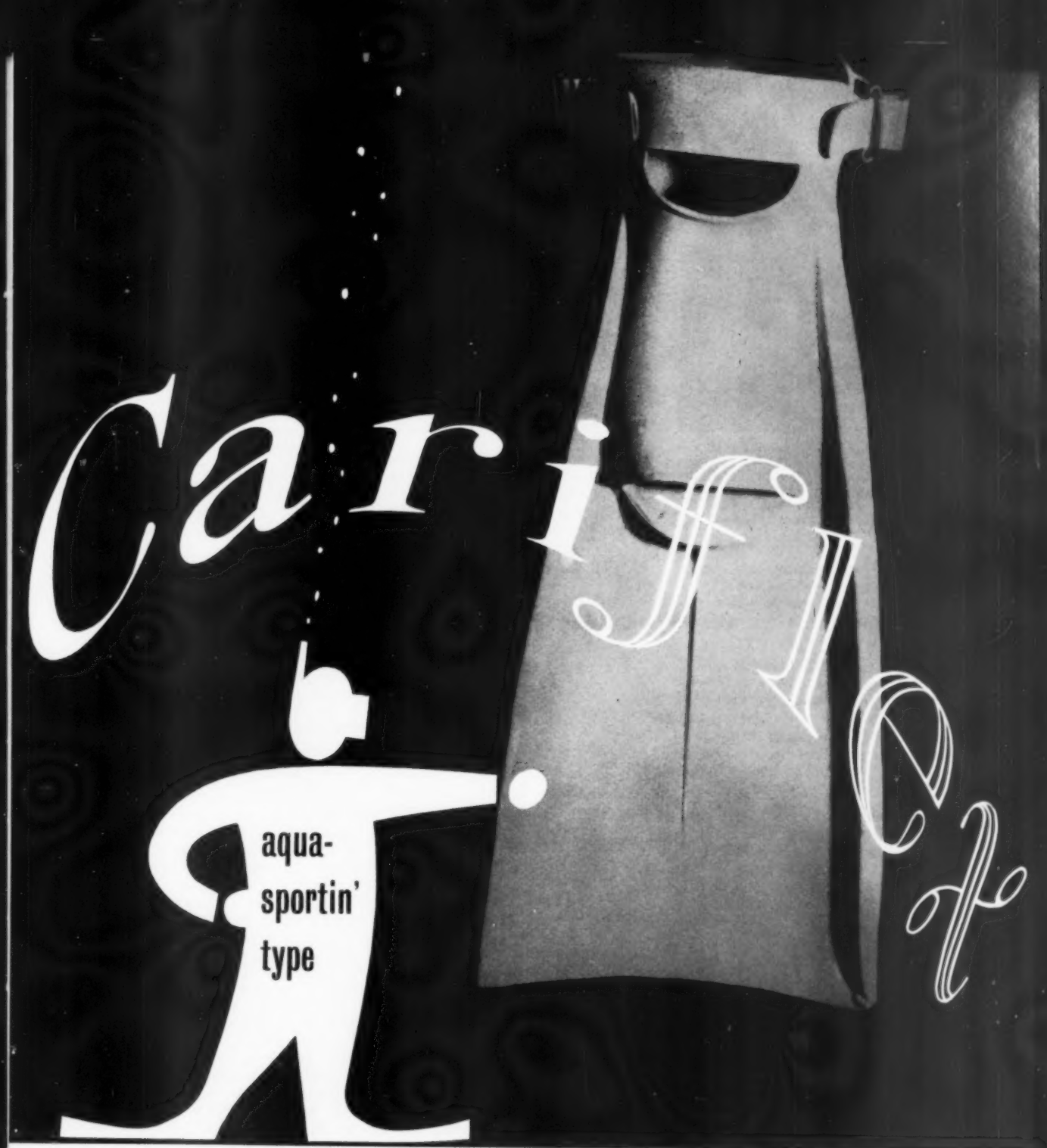
engineering manager, will be responsible for design, development, production, purchasing and estimating. He has been with the company since 1947 when he joined them from R. H. Windsor Ltd., having previously served an apprenticeship with Leyland Motors in Lancashire. He built up the design team and was responsible for the company's range of bottle blowing machines.

J. S. H. Rodman will handle the sales, general administration and accounting departments. He is a divisional manager of Baker Perkins (Exports) Ltd. with special responsibility for Russia and Eastern Europe and was with the team showing Granbull equipment at the recent British Trade Fair in Moscow.

Castrol Industrial Ltd.

J. A. V. Watson will be appointed assistant managing director of Castrol Industrial Ltd. when W. F. List retires on January 1 1962. He will also become an assistant managing director of the parent company Castrol Ltd., which is planning to acquire 75% of the share capital of Melwood Thermoplastics Ltd. (*RPW* June 24, 1004).

Chief M. W. Sowole, chairman of the Western Nigeria Industrial Promotions Commission, returned from a tour of Europe and USA last week. My picture was taken at the Dunlop headquarters in London — Dunlop is to set up a £2m. tyre factory in Nigeria (*RPW*, May 27, 784). Left to right: Cecil Stack, Dunlop overseas manager; Chief Sowole; T. E. Peppercorn, Dunlop director; and Folarin Coker, secretary of the Industrial Promotions Commission



'Cariflex'-clad skin divers plumb the fishy depths—propelled by 'Cariflex' swim fins. The light colours of 'Cariflex' SBR types S1502, S1509, S1707 and SP103 are perfect for gaily coloured sports gear. These 'sportin' types' make a wide colour range possible, they're durable — resist ageing and discolouration — and they're easily moulded. 'Cariflex' Isoprene Rubber is also widely applied in sports goods, particularly in gum compounds or those using non-reinforcing fillers.
For swimming and water-ski equipment, inflatable boats, lifejackets and water wings, tenniquoits and beach balls, sports shoes and football studs—and many other applications—'Cariflex' is the right rubber for the job.

'CARIFLEX' SHELL-MADE RUBBER

For further information consult your Shell Company (in the U.K., apply to Shell Chemical Company Limited, Plastics & Rubbers Division, 170 Piccadilly, London, W.1.)

Shell Chemicals

SHELL

Arnold Watson is 52. He joined Castrol in 1929 and six months later, at the age of 21, was appointed publicity manager, a position he held until his appointment as general manager, motor and aviation sales, in 1948. Four years later he was elected to the board.

A. K. Simcox and *(right)* **J. S. Hughes who, as announced in this column last week, have joined the board of Midland Silicones Ltd. Mr Simcox has been appointed sales director and Mr Hughes development director**

Shame

The Dominican Republic's agricultural department has distributed 10,000 rubber trees in the Villa Riva. But not really for the rubber. Latex, it seems, has been put in the shade by cocoa — the trees are said to be 'primarily intended to provide shade for coffee and cocoa growing'.

Pitching for abs

A good sales point with abs is its high impact strength — and Anchor Chemical, who are agents for Borg Warner's Cycolac, gave me a good illustration of the point the other day.

One-piece baseball helmets are now being injection moulded in the material, which can withstand sudden blows due to hefty pitches and overthrows. The limit set on the material in this application is shown by the fact that they are for 'young ballplayers of all ages'.

Appointments in Brief

Kenneth Boreham has been appoined sales manager of Tempered Rubber Components Ltd., a member of Tempered Group Ltd., of Sheffield. Previously he was general sales manager of Reed Bros. (Engineering) Ltd.

* * *

H. J. Northeast, general sales manager of Dunlop Chemical Products Division, Birmingham, has been elected chairman of the Midland Market Research Group for 1961-62.

F. W. Douse has relinquished his position as managing director of the Anglo-Ceylon and General Estates Co. Ltd. but he will continue to be chairman of the company.

* * *

BTR Industries Ltd. has made G. E. Timms chief engineer of its Silvertown factory, London, E.16. Mr Timms was previously with the Distillers Co. Ltd.

Basil Aldis has been appointed deputy general manager of the British Plastics Federation. He will be particularly concerned with membership

Polly Ester Says...

'French chalk — for blue blackboards'

THE LEGAL ANGLE

Sauce for the Union Gander?

By a Barrister

'A strike by 88 men in the finishing department of the India Tyre Co.'s factory at Inchinnan, Renfrewshire, earlier this week brought work almost to a standstill'. — RPW May 13 1961.

Strikes do not happen just like that — someone organizes them. Sometimes it is an official move, sometimes an unofficial walk-out. But, like every other movement, a strike must have its leaders.

Now, we know that where strikers give proper notice of their intentions, there is no breach of contract law. But where there is a 'wildcat' strike, or a sudden sit-down, or simply a refusal to work for which short notice has been given, then the men are in breach of their contracts of service. And the leader of the strike or sit-down had induced those breaches of contract.

Equally, we know that where one employer induces someone else's servant to break his contract of service — usually by persuading the servant to come over to work for him, without giving proper notice to his present boss — the procurer of the breach is liable to pay damages to the injured employer. It is, then, a basic principle of contract law that you shall not only not commit breaches yourself but that you shall not procure or induce others to break their contractual obligations.

What, then, about the strike organizer? When, if at all, can you bring him to Court, claiming an injunction to prevent him from bringing your works to standstill — or as it were, planting a plastic bomb in your rubber plant? And does it make any difference if the strike is official or unofficial?

Section 3 of the Trades Dispute Act, 1906, is specifically designed to protect union organizers (and, at the same time, any other organizers) who, as a result of a trade dispute, induce people to break their contracts of service.

'An act done by a person in contemplation or furtherance of a trade dispute', it says, 'shall not be actionable on the ground only that it induces some other person to break a contract of employment or that it is an interference with the trade, business, or employment of some other person, or with the right of some other person to dispose of his capital or his labour as he wills'.

If, then, there is a trade dispute and, in contemplation or furtherance of that dispute, someone calls your men out on strike — or if you, perhaps, decide that you and your colleagues are being imposed upon and you yourself march them into battle with the boss — Parliament spreads its kindly wings over the organizer and protects him from the wrath of the common law.

Strike organizers — whether official or unofficial — are almost invariably immune from actions for inducing breaches of contract, provided that there is some trade or industrial argument or dispute. Which is, itself, a very striking fact . . .

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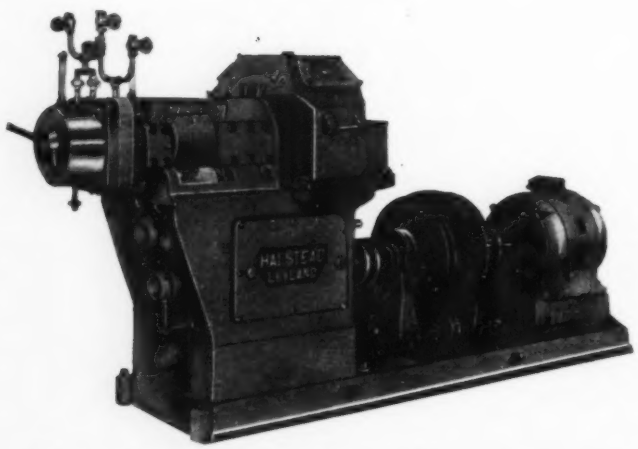

3½" rubber extruder with variable speed dynamatic coupling drive

Plantation Newsletter

NR SEARCHES FOR A SUPERMAN

by our Malayan Correspondent

FROM KUALA LUMPUR

ONCE again Malaya has started a world-wide search for a 'superman' to lead its rubber industry. He will succeed Sir Geoffrey Clay, who retires from his post of Controller of Rubber Research in March next year.

Advertisements have appeared in the Malayan press and in newspapers and scientific journals in Europe and America.

The Controller of Rubber Research is also chairman of the boards of the Natural Rubber Bureau, the Natural Rubber Producers' Research Association, the Rubber Research Institute and the Malayan Rubber Fund.

Sir Geoffrey has declined an offer to extend his contract. He is now 65 and will be 66 before the end of this year. 'I feel it will be a great strain to continue to serve longer in the tropics. When I took up the job two years ago I did not expect to carry on for more than three years', he said here.

The post carries a salary of between $42,500 and $59,500 a year, according to qualifications. Candidates must be between 40 and 55 years of age. The successful candidate must be available to take up the job not later than the end of December.

The appointment will be made by Malaya's Minister of Commerce and Industry, Inche Mohamed Khir Johari. A board of two representatives of the Ministry and two from the Rubber Producers' Council will advise the Minister on the selection.

It was also announced here that a Malayan has been chosen for training as representative for the Malayan Rubber Fund Board in London to take the place of E. Jago, who retires at the end of next year.

He is 33-year-old Lim Kim Cheng, a secretary in the Malayan Treasury. He was formerly senior assistant controller of trade in the Ministry of Commerce and Industry and senior assistant controller of Industrial Development.

He represents the Treasury on the board of the Rubber Research Institute. He obtained a BA (Honours) degree at the University of Malaya and a Bachelor of Science (Econs.) degree at the London School of Economics. He is expected to leave for Britain in October. For one year his appointment will be on a probationary period during which time he will understudy Mr Jago.

Sir Geoffrey said the post of representative for the Malayan Rubber Fund Board was a very important one. The representative in London is also vice-chairman of the boards of the Natural Rubber Bureau and the Natural Rubber Producers' Research Association.

Keeping the Weeds Down

A chemical just released on the Malayan market has presented a new concept in weed control during the critical early stages of a rubber tree's growth.

Trials conducted on 80 estates over the last two years have shown that the cost of treating young rubber with the chemical compares favourably with that of hand-weeding.

Listing its advantages, a spokesman for Fisons Chemicals (Malaya) Ltd., said its use would cause weeding costs to remain constant, even in wet weather when heavy soils become difficult to work. Damage caused by changkol weeding was avoided and labourers employed on hand-weeding could be released for more productive work.

One application of the chemical, which comes in powder form, is reported to last for several months.

Although harmless to man and animals it fulfils a separate function to sodium arsenite — due to be officially banned in Malaya from September 1 — and is not designed to replace it.

The makers recommend that it be used to maintain areas free from weeds after clearing but before planting; where leguminous covers are being established; in immature rubber rows; and in older nurseries. It becomes active after being washed by rain into the top 2in. layer of earth.

Known as Simazine 50W, the new chemical received favourable comments from leading figures in the planting industry at a reception here to launch it on the local market through their distributors, Harrisons and Crosfield (Malaya) Ltd.

This chemical is already widely used in Britain and other European countries. Among the biggest buyers are Communist bloc countries which use it to control weed growth in maize-growing areas.

STRUCTURES OF NATURAL RUBBERS Continued from page 91

of these polyisoprenes have the same precursors and are produced by the same enzymes, especially since the isoprenoid structure is widely distributed in natural products, but not all of them are rubbers. In the case of the rubbers the similar stereospecificities may indicate common precursors and reaction mechanisms but different enzymes, one which forms the cis structure and another the trans. Then, for Chicle, the two enzymes would be present in the plant. While recent discoveries[3,5] have led to the production of stereospecific polyisoprenes in organic solvents, the elusive objective of making such polyisoprenes in aqueous media, as the plant does, remains to be attained.

The results in Table 2 show differences in the degree or amount of crystallinity for different samples. Whether these are real or due to the purification procedure is not known for certain. In the case of Guayule, it is known that the deproteinized sample used for the microstructure determination did not give a crystalline x-ray pattern. The sample used for the x-ray measurements reported here was not deproteinized, simply res'n free. Unfortunately sufficient amounts of the samples in question were not available to determine whether this would be true for all.

TABLE 2
MICROSTRUCTURE AND X-RAY DIFFRACTION OF NATURAL RUBBERS

	IR microstructure					X-ray			
	Cis 1.4%	Trans., 1.4%	1.2 %	3.4 %	T.F., %	Cryst.	Ext. %	Inherent viscosity	Gel, %
Hevea brasiliensis ..	97.8	0.0	0.0	2.2	95.0	V. strong	600	8	0
Alstonia scholaris ..	97.8	0.0	0.0	2.2	82.8	Could not stretch		—	—
Castilla elastica	97.6	0.0	0.0	2.4	96.2	None	600	1.9	33
Castilla ulei	97.0	0.8	0.0	2.2	102.2	V. weak	770	—	—
Clitandra orientalis ..	97.7	0.0	0.0	2.3	98.0	None	675	3.0	31.5
Cryptostegia grandiflora	97.7	0.0	0.0	2.3	96.7	Strong	370	—	—
Ficus elastica	97.6	0.0	0.0	2.4	97.4	Trace	600	3.1	14
Funtumia elastica ..	97.6	0.0	0.0	2.4	95.3	V. strong	900	1.7	24.3
Hancornia speciosa ..	97.6	0.0	0.0	2.4	97.0	Trace	775	0.3	11.5
Landolphia specie ..	97.6	0.0	0.0	2.4	97.4	Strong	900	3.2	12.5
Manihot glaziovii ..	97.6	0.0	0.0	2.3	102.2	V. strong	600	—	—
Mascarenhasia elastica ..	97.7	0.0	0.0	2.3	98.3	V. strong	600	—	—
Parthenium argentatum (Guayule)	97.8	0.0	0.0	2.2	95.7	Strong	300	1.3	23.8
Achras zapote (Chicle) ..	22.2	76.5	0.0	1.3	102.3	V. strong	0	0.6	0
Balata and Gutta Palaquium philippinensis ..	0	98.7	0.0	1.3	95.0	V. strong	0	—	—
	All trans. (from spectrum)								

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Plantation Share Survey

SEVERAL interesting takeover deals are spotlighted in this, our latest survey on rubber plantation matters. By far the biggest is the offer from LONDON SUMATRA PLANTATIONS, who have produced bids for the issued capital of six rubber companies whose assets at last balance sheet dates totalled over £2m.

The six companies are BAH LIAS RUBBER ESTATES, CENTRAL SUMATRA RUBBER ESTATES, SIALANG RUBBER ESTATES, NAMOE TONGAN RUBBER ESTATES, BAJOE KIDOEL RUBBER AND PRODUCE COMPANY and DJASINGA. The terms are:

One London Sumatra 2s. share plus 10s. cash for each Bah Lias 2s. share.

One London Sumatra plus 7s. 6d. cash for two Central Sumatra 2s. shares.

Three London Sumatra plus 7s. 6d. cash for five Sialang 2s. shares.

One London Sumatra and 2d. cash for every two Namoe Tongan 2s. shares.

Two London Sumatra and 6d. cash for every 2s. share in Bajoe Kidoel.

Two London Sumatra and 3d. cash for each £1 share in Djasinga.

The directors of all the six companies have accepted the offers in respect of their own holdings and are recommending their members also to accept. London Sumatra group's present holdings represent 34.8% of the issued capital of Bah Lias, 31% of Central Sumatra, 20.5% of Sialang and 22.3% of Namoe Tongan. Shares of London Sumatra issued under the offers will not rank for the dividend of 16% recommended in respect of the year ended March 31 1961, but in all other respects will rank *pari passu* with the existing issued shares. The offers will remain open for acceptance for 21 days from the date of the formal letters of offer which will be issued to members of the six companies as soon as possible.

Parent Company's Profit

Preliminary details of the first annual accounts of London Sumatra, subject to audit, show a group profit in sterling attributable to the parent company of £138,192 for the year to March 31 1961. The dividend requires £106,817 and preliminary and merger expenses of £15,124 are written off. Subsidiaries retain £9,918, and £6,333 is carried forward by the parent company. Where the accounting dates of the subsidiary companies operating in Indonesia are not co-terminous with that of the parent company, the group accounts in Indonesian currency incorporate their results for financial years ended during the twelve month period to March 31 1961. On that basis, the group profit is Rp.173.407m. less Indonesian Company Tax Rp.88.593m., leaving Rp.84.814m.

In his annual review to shareholders Mr F. W. Harper, chairman of London Sumatra, told them that practical experience of the results of the initial merger carried out last year has left the directors more than ever convinced of its advantages. 'We and the other boards concerned are confident that the further extension of the group which is now proposed, will also prove beneficial from the point of view of estate operations in Indonesia'. In addition, the chairman pointed out it will bring into the group KULAI RUBBER ESTATE, a company owning a high-yielding rubber estate in Malaya and valuable trade investments. 'The income from this source and from AUXILIARY INVESTMENTS LTD., which will be a wholly-owned subsidiary if all the offers become effective, will supplement the amount available for dividend in any year during which remittances from Indonesia may be delayed. To achieve this object it has been essential to ensure that shareholders of the Bah Lias, Central Sumatra and Sialang companies are adequately compensated in cash for the reduction in the non-Indonesian element of their investments which will result from acceptance of our offers. The consolidated balance sheet shows that the necessary sterling funds are available for the purpose, thanks to the pooling of resources which resulted from last years merger'.

Crops Harvested

Referring to the company's trading year, Mr Harper said that the sterling accounts presented showed that the majority of the plantation companies in the group received remittances based on their rupiah currency profits for the Indonesian tax year 1957. These constituted the largest component of the groups sterling profit for the period, out of which the board are recommending the payment of a dividend of 16% less income tax. During the year ended March 31 last, total crops of 31,361,317lb. of rubber and 6,815 tons of palm oil and kernels were harvested on the group's estates in Sumatra, these being higher by 11% and 24% respectively than the crops harvested in the preceding 12 months. 'Local finance has caused us acute problems and is still doing so. As you will remember, the greater part of the subsidiaries' Indonesian bank balances was frozen in 1959 and we were left in the position of having to pay taxes in respect of earlier periods out of current earnings'.

Within the limits imposed by these liquidity problems, it has been the policy of the group to maintain as progressive a rejuvenation programme as possible and to press forward the modernization where necessary of workers accommodation and factories. Replanting and extensions carried out on the group's estates in the 1960 planting season totalled 2,928 acres of rubber and 321 acres of oil palms, bringing the total area planted in the last five years up to approximately 12,000 acres.

Offer to Merge

MERLIMAU PEGOH is offering to merge with BUKIT IJOK (SELANGOR) RUBBER and CENTRAL JOHORE RUBBER ESTATES on a share exchange basis. Merlimau, which already holds some 80% of BUKIT IJOK'S and CENTRAL JOHORE'S capital, is offering three Merlimau 2s. units for two Bukit Ijok 2s. units and one Merlimau unit for every Central Johore 2s. unit. Of Bukit Ijok's £73,917 capital, £15,197 is publicly held and of Central Johore's £61,875 capital, there is £12,325 not held by Merlimau. The directors of Bukit Ijok and Central Johore are of the opinion that the plan is advantageous from the holders' viewpoint and point out that there is a freer market in Merlimau stock. If the plan becomes fully effective Merlimau's issued capital will be increased from £1,118,267 to £1,153,388. Merlimau, which paid a 6% interim dividend last month, expects to pay a further 14% next September in respect of the year ended March 31 1961. Holders of Bukit Ijok will receive a dividend of 25% and Central Johore one of 20% later this month for the year ended March 31 1961. The boards of Bukit Ijok and Central Johore are identical, consisting of Sir Harry Townend, T. H. Miller and A. J. Massie, of whom the two first-named are also directors of Merlimau.

Rubber Statistics

MALAYA — USA

MALAYAN rubber exports in May were 54,425 long tons against 55,038 tons in April, according to official statistics released in Kuala Lumpur.

End-April stocks were 62,245 tons, compared with 67,155 tons at end-March. The end-May total was 69,949 tons, totalling 51,454 tons in dealers' hands, 14,201 tons (preliminary) on estates and 4,294 tons awaiting shipment.

May production was 56,495 tons against 48,650 tons in April. Imports were 5,576 tons against 4,480 tons. May local consumption was 536 tons compared with 493 tons in April. Loss in process was 14 tons against 25 tons previously. Statistical errors and omissions were 608 tons.

United States

The US Rubber Manufacturers' Association has announced the following details of tyre production and exports for April.

Production: motor car tyres, 7,866,000; truck and bus tyres, 1,017,000; and motor, cycle, truck and bus inner tubes, 2,939,000.

Exports: motor car tyres, 54,000; truck and bus tyres, 43,000; and inner tubes, 70,000.

Rubber Markets

LONDON

Rubber prices finished the week ending July 12 at a marginal advance. Once again the market followed the dictates of overseas advices and overall business was particularly small, being mainly confined to covering and switching orders.

However, a little uncertainty developed at mid-week when it was known that the Shell Chemical Co., a subsidiary of the Shell Oil Co., had announced the reduction of 2 cents per lb. in its polyisoprene synthetic at the plant in Torrance, California. Dealers said that a possible easing tendency in connexion with this reduction was offset by sellers' reserve against fair covering demand.

Latest prices are as follows:

No. 1 RSS Spot: 24¾d.-25d.

Settlement House:
August 24⅞d.-25d.
September 25d.-25⅛d.
October 25d.-25⅛d.
October/December 25⅛d.-25¼d.
January/March 25¼d.-25½d.
April/June 25¼d.-25½d.

No. 1 RSS cif basis ports:
July 24⅝d.-24⅞d.
August 24¾d.-25d.

Godown:
July 83⅜ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, August, 14s. 5d., cif European ports. Spot, seller, 14s. 10d. Bulk, seller d.w. 14s. 3d. Normal, seller, August, 11s. 6d.

NEW YORK

The New York rubber market ruled as under on July 10:

DEALERS' PRICES

	US cents per lb., ex-dock	
	July 10	Previous
No. 1 RSS, July	29b –29¼a	29¼b–29⅜a
Aug.	29t	29b –29¼a
No. 2 RSS, July	28⅞b–29¼a	29b –29¼a
Aug.	28⅞n	28⅞b–29¼a
No. 3 RSS, July	28⅞b–29a	28⅞b–29¼a
Aug.	28⅞n	28⅞b–29a
No. 1 RSS, Spot	—	—
No. 3 amber blanket crepe, July	25¼n	25¼n

FUTURES — REX CONTRACT

	Close	Prev. Close
July ..	29.05b–29.60a	29.25b–29.50a
Sept. ..	28.90t	29.25b–29.35a
Nov. ..	28.80t	28.85b–29.00a
Jan. ..	28.70b–28.80a	28.75b–28.90a

Sales: Nine. Tendency: Easy.

Rubber futures declined on scattered selling in afternoon trading on July 10 after early steadiness. Dealings were meagre for the day. Physical rubber was quiet. In the closing stage futures showed an easy undertone. Physical rubber was also softer and quiet in late dealings.

SINGAPORE

After opening slightly lower on July 10 the market was quiet but steady. Fluctuations were small. Lower sheet inquiry was routine but sellers being reserved, business was on a small scale. The market closed the morning session quiet but steady. Conditions in the afternoon were very quiet and there was little inclination to trade. Prices held throughout. Lower grade interest was limited.

	Malayan cents per lb., fob Malayan ports to open ports	
	July 10	Prev. Close
No. 1 RSS, July ..	83½–84	84¼–84½
August..	84⅜–84½	84⅜–84⅝
No. 2 RSS, July ..	83½–83⅝	83⅜–84
No. 3 RSS, July ..	82½–83¼	82⅝–83⅜
No. 4 RSS, July ..	79⅝–80	79⅝–80¼
No. 5 RSS, July ..	71¼–72¼	71⅜–72⅜
No. 1 RSS, Spot ..	83⅜–84	83⅝–84¼
No. 3 blanket thick remilled crepe, July	70 –71	70 –71
No. 1 fine pale crepe, July	90½–91½	91 –92
2X thin brown crepe, July	67¼–68¼	67¼–68½

Tendency: Quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 163.80d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on July 10:

No. 1 RMA	Guilders per kilo	
	July 10	Previous
July	2.31	2.31
August	2.31	2.31
September	2.31	2.31
July/September ..	2.31	2.31
October	2.32	2.32
November	2.32	2.32

Sales: Nil. Tone: Quiet.

DJAKARTA

	Rupiahs per kilo	
	July 11	Previous
No. 1 Priok, Spot ..	32.50b	32.50b
No. 2 Priok, Spot ..	31.50b	31.50b
No. 3 Priok, Spot ..	30.50b	30.50b
No. 1 fine pale crepe, Spot	30.50b	30.50b

Tendency: Quiet.

CEYLON

The price of No. 1 RSS at Colombo on July 10 was 101 (101¼) Ceylon cents per lb.

BANGKOK

The price of No. 1 RSS at Bangkok on July 10 was 27.00 (27.12½) US cents per lb.

IRI NEWS

Rhodesian Black Talk

Members of the Rhodesian section of the Institution of the Rubber Industry, under their chairman B. J. Strom and secretary Stanley Hill-Smith, were addressed recently by John A. Tallant, managing director of the new Phillips Carbon Black Co. (Pty.) plant at Port Elizabeth.

First in Africa

This was the first address of its kind made by the head of the first carbon black plant in Africa. Before coming to South Africa two years ago Mr Tallant was co-ordinator of all the carbon black and synthetic rubber activities of Phillips Petroleum Co. in the USA.

Introduced by B. J. Strom, rubber factory manager of the Rhodesian Bata Shoe Co., in whose club the event took place, Mr Tallant spoke in detail on the history of the carbon black industry, and highlighted the immense progress made by oil furnace blacks over the past 20 years to the point where in 1960 oil furnace black represented nearly 70% of the total production of all types.

Soviet Plastics

The first issue of *Soviet Plastics* — a cover-to-cover translation of the Russian journal *Plasticheskie Massy* — has been published under the scheme sponsored by the Department of Scientific and Industrial Research for the translation of Russian journals. It is translated by the Rubber and Plastics Research Association of Great Britain and published by Rubber and Technical Press Ltd., Gaywood House, Great Peter Street, London, S.W.1.

The issue includes articles on certain thermal properties of polypropylene; the thermal breakdown of hardened epoxy resins; polymers with inorganic main molecular chains; and the mechanical testing of plastics.

It will be published monthly and the subscription rate is £14 for 12 issues.

● A review of the first issue of *Soviet Plastics* will appear in 'Views and Reviews' in a future issue of *RPW*.

Moltopren Polyurethane

In 'Views and Reviews' July 1 issue, reference was made to 'Moltopren foam rubber'.

J. M. Steel and Co. Ltd. has pointed out that Moltopren — a Farbenfabriken Bayer AG trade mark — is actually a polyurethane foam.

Industry INTELLIGENCE

Technical Data

Silicone Foam Control

A folder entitled 'Silicones for Foam Control', recently issued by I.C.I. Ltd. Nobel Division, Silicones Department, Stevenston, Ayrshire, contains three leaflets.

The first of these gives general information about foam prevention and describes the I.C.I. products available to suppress and control foams in a wide range of applications. One advantage claimed for silicones in this respect is that they are effective in very low concentrations. The two remaining leaflets deal in more detail with Silcolapse antifoam agents, and F110 and F111 fluids for foam prevention respectively. The Silcolapse range is designed for controlling or preventing foaming in aqueous, non-aqueous and intermediate systems while fluids F110 and F111, which are pure silicone fluids are intended primarily as antifoam agents for hydrocarbon systems.

Other folders of a similar character are available, or under preparation, on the uses of I.C.I. silicones in a wide variety of specific applications.

Fillers for PVC

A technical bulletin concerning the use of precipitated and activated calcium carbonates as fillers for pvc compounds, has been published by John and E. Sturge Ltd., Wheeleys Road, Birmingham 15.

The 12-page bulletin includes a table showing the grades of calcium carbonate available, and lists their respective properties together with their main uses. Other tables show the effects of various grades on a number of pvc compounds, based on tests carried out to appropriate British Standard specifications.

Two pages are devoted to outlining the applications of precipitated calcium carbonates in pvc compounds for injection and compression moulding, extrusion, supported and unsupported calendered sheet and for high quality pvc wall and floor tiles and also dealt with its use in pvc pastes.

Machines, Materials and Equipment

Dryers and Preheaters

Recent developments made by AEW Ltd., Imperial Works, High Street, Edgware, Middlesex, include a hopper fed drying unit with a low total loading of 1.5kW. and a drying capacity of 75-100lb./hr. This is designed for quicker and efficient heating and drying of moulding powders for extrusion and injection. The machine weighs about 200lb. and can be mounted on top of the moulding machine, saving floor space.

A closed-circuit low-temperature drying oven has also been introduced by AEW Ltd. for rapidly drying materials at temperatures as low as 35°C. irrespective of atmosphere and humidity conditions.

The drying unit can be readily regenerated by placing it in the centre of the heating compartment.

Temperature Controller

The Cambridge indicating pneumatic temperature controller is described in a new pamphlet No. 103, available from Cambridge Instrument Co. Ltd., 13 Grosvenor Place, London, S.W.1. This instrument is for controlling the working temperatures of vats, autoclaves, or other similar containers; and the temperatures of refrigerating, air-conditioning, or other similar plants and processes, between −20°C. and +340°C.

When the temperature of the container or process rises or falls beyond a pre-determined level, the controller automatically cuts off the piped supplies of heating or cooling fluid or gas until the temperature returns to the pre-set level. The controlled temperature can either be that of the process or container itself, or, less frequently, that of the piped supplies.

The instrument can be used in almost any industrial process where the flow of heating or cooling medium can be regulated by a diaphragm valve.

Pumping Volatile Liquids

Precision Electrical Products (Stockport) Ltd., Lytham Street, Cale Green, Stockport, have extended their range of self-priming pumps by the introduction of the type 14 range, the maximum capacity of which is 140 gallons/min. and maximum head obtainable 300psi.

These pumps are of the regenerative type, self priming on the liquid ring principle. The regenerative turbine creates an internal circulating effect within the pump casing which enables each pump stage to develop about six times the head of a conventional centrifugal pump having an impeller of equal peripheral speed.

The dynamic suction lift amounts to 28ft. and the pump will evacuate a line of up to 300ft. in length. Unlike a conventional centrifugal impeller the type 14 does not lose prime if air or gases enter the pump casing. It is therefore suitable for handling hot or volatile liquids and can be used to advantage for handling liquids having entrained air or gases. It is particularly useful for overcoming difficult suction conditions.

The motor and pump are separate units either of which may be removed from the bedplate without disturbing the other. This form of construction also enables any preferred make of British Standard drip proof or totally enclosed fan-cooled motor fitted. For liquid temperatures exceeding 230°F. the pumps are available with water-cooled stuffing boxes and bearings, and in this form will handle temperatures of up to 400°F.

Publications

Carbon Black Abstracts

'Carbon Black Abstracts' is a quarterly periodical prepared by the Cabot Technical Information Service in Boston, Mass., and distributed in the UK by Cabot Carbon Ltd., 62 Brompton Road, London, S.W.3. The latest issue, Vol. 10, No. 1, contains 215 abstracts on carbon black, divided into four groups as follows: 1, Production and Processing; 2, Applications; 3, Fundamental Properties; 4, Economics, Statistics and News of the Industry. The second group comprises electrical and miscellaneous applications of finely divided carbons, the uses of carbon black in plastics and synthetic resins, and sections on rubber and colour blacks.

Laporte Serving Plastics

A booklet recently published by Laporte Industries Ltd., 1-5 New Bond Street, London W.1, lists the Laporte Group products for the plastics industry and briefly summarizes their uses. 'The Laporte Group', says the introduction, 'is fully alive to the constant progress in the plastics field and the companies of the group themselves place great importance upon research and development, for which the group has extensive and up-to-date facilities'.

Products mentioned in the booklet include organic peroxides for initiating polymerization of vinyl type monomers, including polyester resins, vinyl chloride and styrene. Other products manufactured such as hydrogen peroxide, ammonium persulphate and potassium persulphate are employed in the manufacture of stabilizers and plasticizers and in emulsion polymerization.

Laporte Titanium Ltd. makes Titanium Dioxide, widely used as a filler and Howards of Ilford produce Howflex plasticizers and organic solvents, other companies in the group are The Fullers' Earth Union Ltd., and Peter Spence and Sons Ltd.

Bonded Fabric Interlinings

The second in the series of booklets describing Solena interlinings has just been issued by Bonded Fibre Fabric Ltd., 9 Henrietta Place, London W.1.

Dealing with the use of Solena in men's wear, the booklet describes the nature and advantages of this interlining and gives hints to the clothing manufacturer on how to handle the material. This introductory section is followed by information on the use of Solena for interlining jackets, raincoats, overcoats, blazers and tropical wear.

Material Prices

Prices of materials appear regularly in RUBBER AND PLASTICS WEEKLY each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

Unless otherwise stated prices are per lb. In most cases prices vary according to quantity. pc—per cwt pg—per gallon pt—per ton ag—according to grade xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha 5s. 8d.—6s. 4d.
Ancap cp 2s. 10d.—3s. 8d.
Ancap Zinc Salt cp 3s. 2d.—4s. 2d.
Ancatax cp 3s. 9d.—4s. 6d.
Ancazate BU cp 6s. 3d.—6s. 9d.
Ancazate ET cp 5s.—6s. 4d.
Ancazate ME cp 6s. 2d.—7s.
Ancazate Q cp 6s. 1d.—6s. 4d.
Ancazate XX cp 5s. 1d.—5s. 9d.
Ancazide ET cp 5s. 9d.—6s. 6d.
Ancazide IS cp 7s. 6d.—8s. 6d.
Ancazide ME cp 4s. 6d.—5s.
Cu.D.D. 9s. 3d.—10s.
D.Bu.D. 10s. 6s.—11s. 3d.
D.D.D. 12s. 2d.—13s. 3d.
D.P.G. cp 3s. 5d.—4s. 2d.
D.O.T.G. cp 4s. 5½d.—4s. 9d.
Dibenzo GMF 27s.—28s. 6d.
Furbac cp 5s.—5s. 9d.
Gamma 10s. 6d.—11s. 3d.
GMF 27s.—28s. 6d.
L.M.D. 9s. 3d.—10s.
M.Z.I. 3s. 6d.—4s. 2d.
N.Bu.D. 10s. 6d.—11s. 3d.
Ni.P.D. 12s. 2d.—13s. 3d.
P.P.D. 12s. 2d.—13s. 3d.
P.T.D. 12s. 2d.—13s. 3d.
Robac 22 10s.—11s. 3d.
Robac 44 9s. 1d.—9s. 10d.
S.P.D. 9s. 3d.—10s.
Suparac M 9s. 7d.
T.B.U.T. 15s.—16s.
T.E.T. 6s. 6d.—7s. 4d.
Thiuram P.25 15s.—16s.
T.M.S. 7s. 8d.—8s. 6d.
T.M.T. 5s. 4d.—6s. 3d.
Vulcacit CZ deldp 7s. 1d.
Vulcacit F deldp 4s. 8½d.
Vulcacit NP deldp 11s. 2d.
Vulcacit P Extra N deldp 8s. 1d.
Z.B.E.D. 15s.—16s.
Z.Bu.D. 6s. 3d.—7s. 3d.
Z.D.C. 5s. 1d.—5s. 7d.
Z.L. 9s. 3d.—10s.
Z.P.D. 9s. 3d.—10s.

Antioxidants and Antiozonants

Agerite AK cp 3s. 6½d.—4s. 5½d.
Agerite HPX cp 4s. 5d.—4s. 10d.
Agerite Powder cp 3s. 7d.—4s.
Agerite White cp 8s. 10d.—9s. 7d.
Antioxidant 2246 cp 11s. 8d.—12s. 4d.
Antioxidant 425 cp 18s. 6d.—19s. 3d.
Antioxidant SP cp 3s. 8d.—5s.
BLE-25 3s. 7d.—4s. 5d.
BXA 3s. 6½d.—4s. 5½d.
Naugawhite 4s. 9d.—5s. 6d.
Octamine 3s. 9d.—4s. 6d.
Polygard 3s. 7½d.—4s. 5d.
UOP 88 xs 9s. 3d.
UOP 288 xs 9s. 3d.
Wing-Stay S 3s. 8d.—4s.
Wing-Stay T 4s. 10d.—5s. 6d.
Wing-Stay 100 10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptag £10—£40
Calcium Silicate del 9d.—10½d.
Calcene ptxw £52—£69 10s.
Carbonate, Light Mg. ptsp £97
Carbonate, Actidated Ca. pt £28—£30
Carbon Blacks:
Conductex SCF 1s. 2½d.
Continental AMPC ag 11½d.—1s. 4½d.
Continex FEF ag 9½d.—10½d.
Continex HAF ag 10½d.—11d.
Continex HMF ag 9½d.—9½d.
Continex ISAF ag 1s. 0½d.—1s. 0½d.
Continex SRF, SRF-NS ag 8½d.—9d.
Dixie 45 GPF xs 6½d.—7½d.
Dixie 60 HAF xs 7½d.—8½d.
Dixie 70 ISAF xs 9½d.—10½d.
Dixiedensed HM MPC xs 11½d.
Dixiedensed 77 EPC xs 11½d.
Furnex SRF 9d.
Kosmos 45 GPF 6½d.—7½d.
Kosmos 60 HAF 7½d.—8½d.
Kosmos 70 ISAF 9½d.—10½d.
Magecol 888 cp 7.60d.
Micronex MPC 11½d.
Micronex W6 EPC 11½d.
Philblack A. FEF 7d.—8d.
Philblack E. SAF 1s. 0½d.—1s. 1d.
Philblack G. GPF 6½d.—7½d.
Philblack I. ISAF 9½d.—10½d.
Philblack O HAF 7½d.—8½d.
Regal 300 7½d.—8d.
Regal 600 9½d.—10d.
Statex B. FF 10½d.
Statex R. HAF 11d.
Statex 93 HMF 9½d.
Sterling SO FEF 7d.—7½d.
Ster.ing V. GPF 6½d.—7d.
Ukarb 327 GPF xs 6½d.—7½d.
Ukarb 340 xs 7½d.—8½d.
Vulcan 6 ISAF 9½d.—10d.
Vulcan C CF 11d.—11½d.
Vulcan 3 HAF 7½d.—8d.
Vulcan XXX SCF 1s. 2½d.—1s. 2½d.
China Clay ptagxs £12—£68 10s.
Factice Dark cp 1s. 0½d.—1s. 7d.
Factice Whitbro cp 1s. 3½d.—1s. 11d.
Factice White 1s. 4½d.—1s. 8½d.
Kieselguhr Spanish White ptxs £37 12s. 6d.
Lithopone 30% ptxs £68 10s.
Manosil VN3 pt £109—£139
Manosil AS7 £84 10s.—£114 10s.
Micafine Powdered Mica ptxs £67 10s.
Ochre Yellow pcxs £1 19s.
Oxide Light Mg ptsp £245
Oxide Red pcxs £4 3s.
Oxide Titanium 98% pcxs £8 8s
Rutiox CR pcxs £9 3s
Rubber Gen. Gran. Mineral ptxs £35 5s.
Shellac Dewaxed xs 2s.—3s. 9d.
Shellac Orange xs 1s. 9d.—2s. 3d.
Silica Hydrated ptxs £113
Sulphur Manox Insoluble del 1s. 9d.
Sulphur Powdered ptdel £20 17s.
Sulphur Sublimed Flowers ptxs £52 10s.
Talc Norwegian ptxs £13 7s. 6d.
Talc Italian ptxs £30 2s. 6d.
Tufknit Durham CS 8½d.—10½d.
White Lead Dry ptdelsp £114 15s.
Whitetex 2 Clay ptxs £45 10s.
Whiting ptxs £5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel £6

Plasticizers and Softeners

Abalyn pc 220s.—271s.
Al Stearate ptxwdp £253 10s.
Bisoflex 102 pt £513—£568
Butyl Ricinoleate 2s. 6d.—2s. 6½d.
But. Ac Ricinoleate 3s. 0½d.—3s. 1½d.
Butyl Stearate pt £277—£282
Ca. Stearate ptcp £220
Diallyl Phthalate 3s. 11d.—4s. 11½d.
Dialkyl Phthalate pt £221—£222
Dibutyl Phthalate pt £203—£204
Dibutyl Sebacate 5s. 9½d.
DiOA pt £354—£357
DiOS sp 5s. 0½d.—5s. 2d.
DOA pt £414—£420
DOP pt £276—£277
DOS sp 5s. 7½d.—5s. 9d.
Disobutyl Phthalate pt £196—£197
Diisooctyl Phthalate pt £221—£222
Dinonyl Phthalate pt £211—£212
DNS sp 5s. 2½d.—5s. 4½d.
Ester Gum pcag 130s.—150s.
Flexol 3GO 4s. 8d.
Hercolyn pc 242s.—294s.
Lankroflex ED3 3s. 2d.—3s. 2½d.
Lankroflex 29 pt £216—£217
Lead Stearate ptxwdp £223 10s.
Methyl Ricinoleate 2s. 4d.—2s. 4½d.
Me. Ac Ricinoleate 2s. 11½d.—3s. 0½d.
Polyglycol Oleate 400 pt £285
Reomol D79A pt £354—£357
Reomol D79S sp 5s. 0½d.—5s. 2d.
Reoplex 100 sp 6s. 1½d.—6s. 2½d.
Reoplex 110 sp 5s. 10d.—6s. 5½d.
Reoplex 220 sp 5s. 6½d.—5s. 8d.
Reoplex 300 sp 7s. 2d.—7s. 3½d.
Reoplex 400 sp 4s. 2½d.—4s. 4d.
Rosin Oil pgag 8s.—18s.
Triphenyl Phosphate pt £366
Tricresyl Phosphate pt £233
Trixylyl Phosphate pt £200
Zinc Stearate ptdel £220—£230

Solvents and General Chemicals

Acetic acid ptdel £77—£100
Acetic Anhydride ptdel £128
Acetone ptdel £75—£120
Alcohol:
Absolute 74.5 op pgdel 4s. 0½d.—4s. 4½d.
Butyl pt £132—£193 10s.
sec-Butyl ptdel £128—£168
Ter-Butyl ptdel £172—£195
Isopropyl Tech. 99% pgdel 5s.—6s. 5½d.
Butyl 'Carbitol' pt £283
Butyl Acetate pt £159—£217
Caprylic Acid ptdel £395
Carbon Bisulphide ptxs £71 10s.
Carbon Tetrachloride pg 12s. 4d.—20s.
'Cellosolve' Acetate pt £250
Cresol m- 98% del 4s. 9d.
Cresol o- 30/31°C. del 1s.
Cresol p- 34/35°C. del 5s.
Ethyl Acetate pt £131—£189
Formaldehyde ptdel £40
Glycol:
Diethylene pt £158
Ethylene pt £132
Polyethylene 200 pt £214
,, 300 pt £214
,, 400 pt £214
,, 1,500 pt £264
,, 4,000 pt £274
,, 6,000 pt £294
Isopropyl Acetate pt £126—£184
Isobutyl Acetate 80% pt £126—£185
Lauric Acid ptdel £273
M.E.K. ptdel £134 10s.—£143 10s.
M.I.B.K. ptdel £166—£209
Methylated Spirits pgdel:
Industrial 61op 5s. 5½d.—7s. 2d.
,, 74 op 6s. 3d.—7s. 11½d.
'Q' grade 68 op 8s. 5½d.—10s. 5d.
Pyridinised 66 op 5s. 10d.—7s. 6½d.
Denatured Methanol 3s. 9½d.—4s. 10d.
Monoethanolamine pt £252
Naphtha Coal tar pg:
Heavy 90—190 4s.
Light 90—160 5s. 1d.
Palmitic Acid ptdel £147
Phenol pldel 1s. 4d.—1s. 7d.
Pyridine pg 16s. 6d.
Stearine ptag £108—£130
Toluol Pure/Nitration pg 5s. 8d.
Toluol 90's pg 5s.
Triethanolamine pt £224
Xylol 2/30 pg 5s. 9d.

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

APPOINTMENTS VACANT

6d. a word, Minimum 12/6 Box 2/-

APPLICATIONS are invited for the position—foreman extrusion department of a rubber company in Surrey. Pension and bonus schemes in operation.—Write in confidence, giving full details of age, experience and present salary to Box 1150. (1150)

HOSE technologist required for new factory. Applicants should have knowledge of braided and wrapped constructions (both machine and hand made), and should be able to design and develop new products. Compounding experience an asset, but not essential. Excellent prospects for the right man. A contributory pension scheme is in operation.—Apply in confidence to Box 1178. (1178)

THE RUBBER REGENERATING CO. LTD.

HAS A VACANCY FOR A

SENIOR RUBBER TECHNOLOGIST

Basically the position carries responsibility for

- investigations into the compounding of natural and synthetic rubber (wet and dry) with particular emphasis on the application of reclaim, accelerators and anti-oxidants in rubber manufacture.
- the preparation of technical reports.
- contributing to the preparation of technical literature.

Applications, which will be treated in strict confidence, should give details of age, education, technical standard and experience and be addressed to:—

Personnel Manager,
Rubber Regenerating Co. Ltd.,
Trafford Park,
Manchester, 17.

(1169)

APPOINTMENTS VACANT

Due to the considerable expansion of their Sponge Production Department

THE HUNTINGDON RUBBER COMPANY LIMITED

desires to recruit a

SPONGE CHEMIST

for

technical development work on all aspects of the production of present and future sponge products, under the direction of the Research Chemist,

and a

SPONGE TECHNICIAN

for the

technical supervision of sponge production in the factory, to work under the direction of the Assistant Works Manager.

Excellent working conditions, pension scheme.

Apply in the first instance to the Secretary, The Huntingdon Rubber Co. Ltd., Ferrars Road, Huntingdon, giving details of previous experience, qualifications and salary required. (1179)

TECHNICAL APPOINTMENTS

REDFERN'S RUBBER WORKS LIMITED, HYDE, CHESHIRE

wish to appoint:

HEAD OF DEVELOPMENT

A high-calibre Technologist of wide experience and possessing commercial flair is needed to initiate and control work on development projects in this company and in collaboration with associated companies in the Redfern group.

Responsibilities would include overseas liaison. This is a top level appointment and will carry excellent prospects of a directorship.

SENIOR TECHNOLOGISTS

Well-qualified Technologists are required for:

(a) Compound development and process control and
(b) Product development activities.

There are excellent prospects of progress for men of initiative.

The company is engaged upon a programme of expansion in various markets, including specialized and general extrusions and mouldings.

Candidates are asked to give full details of their experience and to state preferences and salary required.

Applications, which will be treated in the strictest confidence, to:

Managing Director,
Redfern's Rubber Works Limited,
Hyde, Cheshire. (1160)

APPOINTMENTS VACANT

RUBBER TECHNOLOGIST

required, Associateship standard, to take charge of a team engaged on compounding research and physical test development, applied to a range of polymer types.

Salary £850 per annum or according to qualification and experience.

This is an interesting opportunity for an ambitious young man to gain wide research experience and to publish papers.—Apply to Dr. Falconer Flint, Director of Research, Factice Research and Development Association, 12 Brook Road, Fallowfield, Manchester 14, or by telephone to RUSholme 5198. (1181)

RUBBER technician required by substantial old-established company in the Midlands, to take control of a medium-sized latex dipping plant, able to control quality and production of small mass-produced dipped latex goods. The post offers exceptional prospects for advancement with a company enjoying a world reputation for its goods. Give full details of training and experience, age and salary expected, in confidence.—Box 1172. (1172)

TECHNOLOGISTS required by large rubber company in the Manchester area for the following positions:—

(1) Development of mouldings and general mechanical goods in rubber and plastics.
(2) Development of factory making and control specifications for rubber and plastic proofed goods.
(3) Young man required for chemical and physical control testing of proofed goods, cables and footwear.

Salary will be dependent on age, experience and qualification. —Reply to Box 1168. (1168)

VACANCY exists for an assistant in our Manchester control laboratories. LIRI standard or equivalent.—Write for interview to Technical Manager, Phillips Rubbers (Mfg.) Ltd., Bromley Street, Manchester, 4. (1171)

MANAGEMENT OPPORTUNITY

A leading tyre retreading company in Nigeria has two management vacancies for men with sound experience of this section of the Rubber Industry.

The company is one of the biggest in its field and has been operating for over 10 years.

Assistant General Manager

The successful applicant (aged 25/40) will be responsible to the British General Manager for the general management of the company. He must have a sound knowledge of both tyre retreading processes and techniques. He must prove he has the ability to take over the general management of the company when the general manager retires. He will be based at Ibadan but will visit the other factories from time to time.

Initial remuneration is by salary and bonus and will not be less than £2,250; more will be paid to a candidate of outstanding ability.

Factory Manager

A man aged 25/36 is required to manage one of the factories of the company. He will be responsible to the general manager for controlling labour recruited locally, production, administration, getting new business and maintaining existing contracts. Professional qualifications are not essential but he must have sound technical knowledge and experience of tyre retreading techniques.

If he is successful in this job there are good prospects of promotion.

Initial remuneration is by salary and bonus and will not be less than £1,800.

Candidates who are not of British origin should have some knowledge of the English language.

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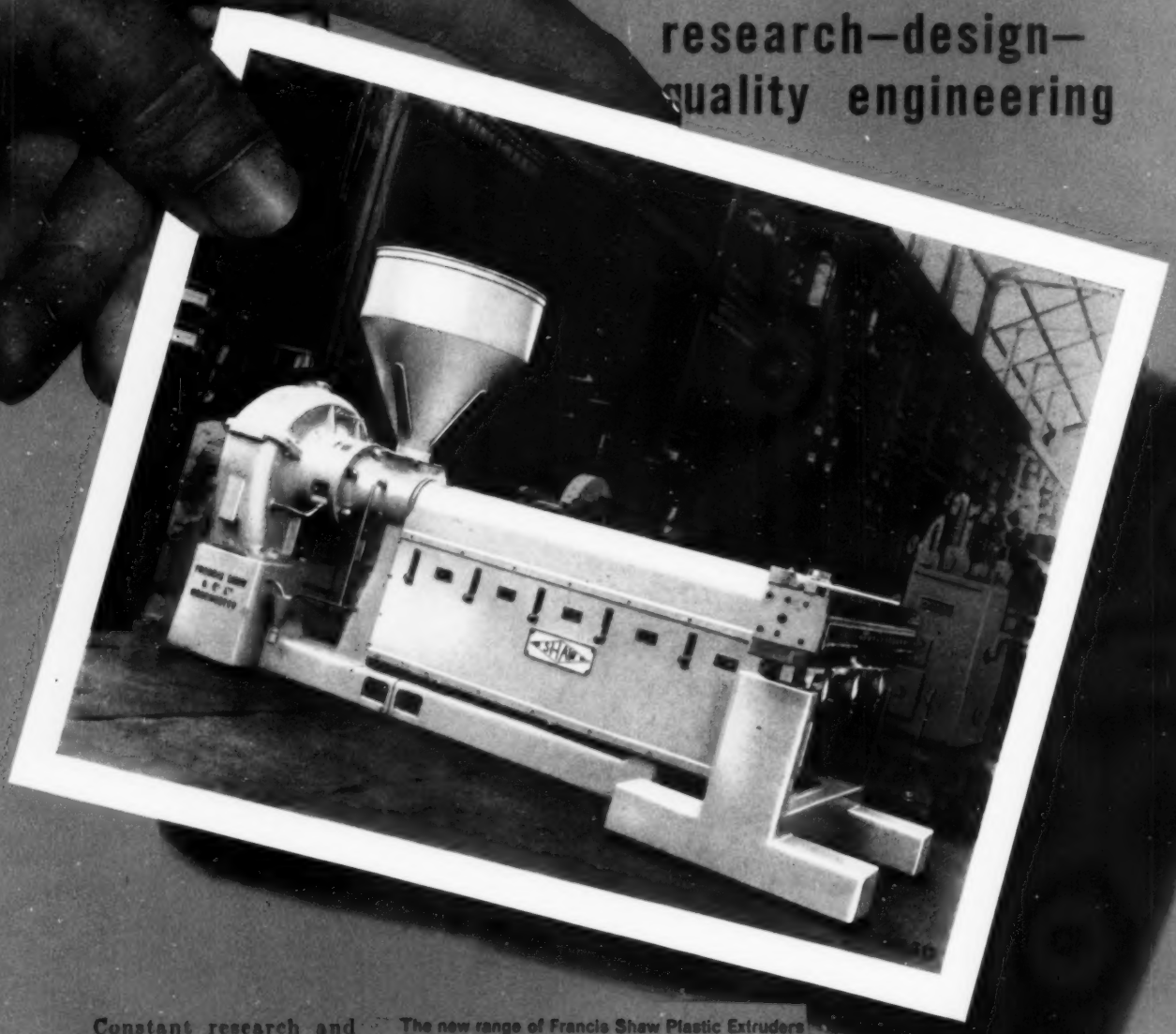

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